"ASSESS THE EFFECTIVENESS OF ORANGE JUICE WITH ELEMENTAL IRON VERSUS ELEMENTAL IRON SUPPLEMENTATION TO INCREASE THE LEVEL OF HAEMOGLOBIN ON ANAEMIA AMONG ADOLESCENT GIRLS IN CORPORATION SCHOOLS IN CHOOLAI, CHENNAI"

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A Dissertation submitted to

THE TAMILNADU DR.M.G.R. MEDICAL UNIVERSITY,

CHENNAI – 600032.

In partial fulfillment of requirements for the degree of

MASTER OF SCIENCE IN NURSING

APRIL 2014

CERTIFICATE

This is to certify that this dissertation titled, **"Assess the effectiveness of orange juice with elemental iron versus elemental iron supplementation to increase the level of haemoglobin on anaemia among adolescent Girls in selected Schools in Choolai, Chennai"** is a bonafide work done by **Ms.E.Viji,** M.Sc(N) II year , College of Nursing, Madras Medical College Chennai-03,submitted to **The TamilNadu Dr.MGR Medical University**, Chennai in partial fulfillment of the award for the degree of **Master of Science in Nursing, Branch-IV, Community Health Nursing** under our guidance and supervision during the academic period from 2012-2014

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ABSTRACT

The prevalence of adolescent anaemia is rapidly increasing all over the world at an alarming rate over the recent years. Anaemia affects the majority of population worldwide. The increase incidence of anaemia in developing countries follows the life style changes, low socio economics, dietary habits, etc. The consumption of orange juice is an influencing factor in improving blood haemoglobin level among anaemic adolescent girls. This study was done to identify the effectivenessof orange juice with elemental iron versus elemental iron supplementation to increase the level of haemoglobin on anaemia among adolescent Girls (10-14) years, in corporation Schools in Choolai, Chennai. An experimental study with pretest posttest control group research design was used and a sample of 60 adolescent girls (30 in experimental and 30 in control group) were selected by using simple random sampling technique. 50 ml of orange juice with elemental iron was given to the adolescent girls in experimental group after lunch daily for 14 days. The conceptual frame work was based on modified model of Wiedenbach's helping Art of clinical nursing theory. The tool used for the study includes structured interview schedule and observation method using haemoglobino meter. The obtained data was analyzed by using descriptive and inferential statistics. The findings of the study showed that, mean haemoglobin in the experimental group was 9.84, and post-test mean haemoglobin was 10.98. t = 14.21, p = 0.001*** it was highly significant with confidence interval of 95% whereas in control group the pre-test mean haemoglobin was 9.96, and post-test mean haemoglobin was 10.44. t = 1.99, P = 0.05* it shows significant improvement in blood haemoglobin level after an intervention .Orange fruit is easy availability, palatability and improves the general wellbeing of the adolescent girls, and prevents them from developing future complications.

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CHAPTER - I

INTRODUCTION

“ADOLESCENT WOULD BE THE BEST INVESTMENT FOR FUTURE”

- SUNDARLAL

Health is a fundamental human right and health is central to the concept of quality of life. Today’s children are future pillars.

Adolescence is a period of the second decade of life. They constitute over one fifth of India’s population. Adolescence begins when the secondary sex characteristics appear and ends when somatic growth is completed and the individual is psychologically mature, capable of becoming a contributing member of society. India has the world’s highest prevalence of iron deficiency anaemia among women, with 60 to 70 percent of the adolescent girls being anaemic. Adolescence is considered as a nutritionally critical period of life. The pre-pregnancy nutritional status of young girls is important as it impacts the outcome of their pregnancy. Hence, the health of adolescent girls demands special attention.

According to the World Health Organization (WHO), iron deficiency is the number one nutritional disorder in the world. Dietary iron comes in two forms, heme and nonheme. Heme iron is found in red meats, fish and poultry; nonheme iron is found in plants, like lentils and beans. The decreased dietary iron intake, poor absorption, worm infestation, increased body demand, menstruation are the major causes of iron deficiency anemia among adolescent girls.

The world’s adolescent population is facing serious nutritional challenges which are not only affecting their growth and development but also their livelihood

as adults. Yet, adolescence remains a largely neglected, difficult- to- measure and hard -to- reach population, in which the needs of adolescent girls in particular, are often ignored.

The WHO has defined adolescence as the age period is between 10 to 19 years for both the sexes (married and unmarried). There are about 1.2 billion adolescence in the world, which is equal to 1/5th of the world's population and their numbers are increasing. Out of these, 5 million adolescence are living in developing countries. India's population has reached the 1 billion mark, out of which 21% are adolescents.

Iron deficiency anaemia will be prevented by adequate dietary intake or iron rich foods such as green leafy vegetables like amaranth, spinach, coriander leaves, drumstick leaves, radish leaves, vegetables such as beet root, drumstick, cereals like ragi, barley, cholam (Sorghum), rice (raw milled), legumes like Bengal gram dhal, Black gram dhal, soyabean, Nuts and oil seeds like dates, cherry, fruits such as chickoo, pomegranate and jaggary.

Iron is one of the micronutrient. It is used for the formation of haemoglobin, oxygen transportation, brain development, regulation of body temperature and muscle activity. The decreased haemoglobin level is called as iron deficiency anemia.

Nowadays the young adolescent faces many problems because of their lifestyle modifications such as eating Junk foods, fast foods, snacking, skipping of the meals which are common in urban adolescent girls.

Periodic de-worming should be encouraged for every 6 months once, maintaining hygienic practices like hand washing, wearing regular foot wear practices while going to the toilet. Regular haemoglobin screening tests will identify the iron deficiency anemia in early stage.

Weekly Iron supplementation in adolescent girls will prevent the severe iron deficiency anemia and its complications such as myocardial infarction, and angina. Iron supplementation should be given before meals because the iron will absorb easily in acidic nature or it may be given along with citrus juice like lime or orange juice. Oranges, citrus fruits, and their zest (the shavings of their peel) are all high in vitamin C. Oranges provide 59mg (99% daily value (DV)) per 100 gram serving, 98mg (163% DV) per cup, and 83mg (138% DV) per orange.

Oral iron tablets are usually a safe, inexpensive, and effective treatment for people with iron deficiency. The following tips are recommended:

- Enteric coated (EC) iron tablets are not recommended because iron is best absorbed from the duodenum and jejunum (the first and middle parts of the small intestine). EC iron releases iron further down in the intestinal tract, where it is not as easily absorbed. In some cases, the EC iron tablet passes through the entire intestinal tract with the coating intact, meaning that none of the iron was absorbed.
- Certain foods and medicines can reduce the effectiveness of iron tablets. Iron tablets should not be taken with food, certain antibiotics, tea, coffee, calcium supplements, or milk. Iron should be taken one hour before or two hours after these items. Iron should be taken two hours before or four hours after antacids.
- Iron tablets are best absorbed in an acidic environment; taking iron with one 250 mg vitamin C tablet or orange juice can enhance iron absorption.

There are several types of oral iron. There is no evidence that one form of iron is more effective than another.

- Ferrous fumarate — 106 mg elemental iron/tablet
- Ferrous sulfate — 65 mg elemental iron/tablet
- Ferrous sulfate liquid — 44 mg elemental iron/teaspoon (5 ml)
- Ferrous gluconate — 28 to 36 mg iron/tablet

Teenage girls between 11 and 18 years of age need 14.8mg of iron each day (teenage boys need 11.3mg of iron per day).

Evaluation and Treatment of Iron Deficiency Anemia (IDA) the first-line treatment is oral iron is safe, cost-effective, and convenient. To optimize iron absorption, ferrous salts should be taken with orange juice, since iron is better absorbed in an acidic environment. Furthermore, ascorbic acid reduces the oxidation of ferrous to ferric iron. Ferrous sulfate is typically taken in 300-mg tablets (60 mg elemental iron); ferrous gluconate is taken in 320-mg tablets (36 mg elemental iron) three to four times daily. Since the duodenum can maximally absorb 10–20 mg of iron daily. The therapeutic goal of oral iron therapy is to induce reticulocytosis within days and raise serum haemoglobin by 1–2 g/dl every 2 weeks, ultimately restoring iron stores in approximately 3–4 months the dose is probably adequate.

1.2 NEED FOR THE STUDY:

Nutritional deficiency anaemia is very common in India and iron deficiency is the commonest nutritional deficiency all over the world. According to WHO, over one third of the world's population suffers from anaemia, mostly due to iron deficiency. India continues to be one of the countries with very high prevalence. National Family Health Survey reveals the prevalence of anaemia to be 70-80% in children, 70% in pregnant women and 24% in adult men. The prevalence of anaemia in India is high because of low dietary intake, poor availability of iron, chronic blood loss due to hook worm infestation and malaria.

Despite the fact that iron is the second most abundant metal in the earth's crust, iron deficiency is the world's most common cause of anaemia. When it comes to life, iron is more precious than gold. The body hoards the element so effectively that over millions of years of evolution, humans have developed no physiological means of iron excretion. Iron absorption is the sole mechanism by which iron stores are physiologically manipulated.

Many teenage girls skip meals or try unbalanced fat diets in an effort to lose weight, or they may decide to become vegetarian. As a result, they may not be getting enough iron for their body needs during these years, which put them at higher risk for iron-deficiency anaemia. This condition is common in teenage girls, especially those who have heavy menstrual periods.

Lisa hark., said People with a higher risk for iron-deficiency anaemia include: Women who are pregnant or have heavy menstrual losses, Teenage girls, People with kidney failure or gastrointestinal problems, People who exercise intensely on a regular basis, People who have pica. People with this condition crave and eat nonfood items (such as clay, dirt, or cornstarch), which may block iron from being absorbed in the body.

The average adult stores about 1 to 3 grams of iron in his or her body. An exquisite balance between dietary uptake and loss maintains this balance. About 1 mg of iron is lost each day through sloughing of cells of skin and mucosal surfaces, including the lining of the gastrointestinal tract (Cook et al., 1986). Menstruation increases the average daily iron loss to about 2 mg per day in premenopausal female adults (Bothwell and Charlton, 1982). No physiologic mechanism of iron excretion exists. Consequently, absorption alone regulates body iron stores (McCance and Widdowson, 1938). The augmentation of body mass during neonatal and childhood growth spurts transiently boosts iron requirements (Gibson et al., 1988).

WHO identifies adolescence as the period in human growth and development that occurs after childhood and before adulthood, from ages 10 to19.WHO reports Mortality In 2004 2.6 million young people died (10-24 years). Ninety-seven percent of these deaths (2.56 million), occurred in low- and middle-income countries. Death rates sharply from early adolescence (10-14 years) to young adulthood (20-24 years), the causes varied by region and sex. Over the last 50 years, mortality rates in all age groups from children to adolescents and young adults have declined. However, mortality among young people (15-24 years) has decreased less than for these other age groups, overtaking childhood mortality in high income countries.

STATEMENT OF THE PROBLEM:

"Assess the effectiveness of orange juice with elemental iron versus elemental iron supplementation to increase the level of haemoglobin on anaemia among adolescent girls in Corporation Schools in Choolai, Chennai".

OBJECTIVES:

1. To assess the pre-test haemoglobin level among adolescent girls in the experimental and control group.
2. To assess the post-test haemoglobin level among adolescent girls in the experimental and control group.
3. To assess the effectiveness of elemental iron with orange juice in the experimental group and elemental iron alone in a control group of the adolescent girls.
4. To compare the pre-test and post-test haemoglobin level among adolescent girls in the experimental and control group.
5. To associate findings with the selected demographic variables among adolescent girls in the experimental group.

Operational definition:

1. Effectiveness:

Effectiveness refers to increase in haemoglobin level after administration of elemental iron with orange juice for the period of 14 days.

2. Anaemia:

Anaemia means reduction of the serum haemoglobin level below the range of 12mg/dl of the adolescent girls.

3. Adolescent girls:

In this study adolescent girl refers to the girls belonging to the age group of 10-14 years.

4. Orange juice and Elemental iron:

Administration of orange juice 50ml and elemental iron 36mg/day after lunch for a period of 14 days.

Assumption:

The study assumed that,

1. Most of the adolescent girls were anaemic.
2. Vitamin C enhances the iron absorption, thereby increasing the haemoglobin level.
3. Anaemia is preventable and treatable.
4. Nurses can play a major role in the correction of anemia.

Hypothesis:

H0: There will a significant difference in pre-test haemoglobin level among adolescent girls between the experimental and control group.

H2: There will be a significant difference between pre and post-test mean heamoglobin among adolescent girls in the experimental and control group.

H3: There will be a significant association between the mean haemoglobin and selected demographic variables among adolescent girls in the experimental group.

CHAPTER - II

REVIEW OF LITERATURE

This chapter deals with the information collected with relevant to the present Study through published and unpublished materials. These publications are the foundation to carry out the research work. Highly extensive review of literature pertaining to research topic was done to collect maximum information for laying foundation of the study.

This section has two parts:

2.1: Review of related literature

2.2: Conceptual framework

2.1 REVIEW OF RELATED LITERATURE

1) Literature related to prevalence of anemia among adolescent girls

2) Literature related to factors influencing iron absorption.

3) Literature related to the treatment of anemia

4) Literature related to the effectiveness of orange juice and elemental iron supplementation

Literature related to prevalence of anemia among adolescent girls

Hallalberg. et. al., (1993) Conducted a study to assess the iron deficiency of 15-16 year old girls (n = 220) and boys (n = 207) using serum ferritin (SF). In this study of women regarding the relationship between SF and stainable bone marrow iron, it was established that at a cutoff value for SF of < 16 micrograms/L. Thus the study showed that in 40% of the girls and 15% of the boys SF was below the cutoff value, indicating iron deficiency.

Manimaya. et. Al., (2000) conducted a descriptive study to assess the prevalence of anaemia among adolescent girls in which 630 school going adolescent girls were selected. The result showed that the prevalence of anemia in adolescent girls to be 80.6%.

Muslimmanton. et. al., (2000) conducted a cross sectional study to identify the different nutritional and iron status characteristics of young

adolescent girls (10-12 years) with iron deficiency anaemia and anaemia without iron deficiency in the rural coastal area of Indonesia. Total number of samples 1358 from that anaemic girl (N=133) were selected 34 elementary schools. Haemoglobin, serum ferritin, serum transferrin receptor and zinc were measured for their nutritional status. Out of 133 anemic girls, 29 (21.8%) suffered from iron deficiency anaemia.

Sabithabasu., (2005) conducted the cross sectional study to assess the Prevalence of anemia and determine serum ferritin status among 1120 healthy adolescent (12-18 years) girls in a rural school in Chandigarh in India. The results were 23.9% of adolescent girls having a high prevalence of iron deficiency anemia.

Sen. A., (2006) conducted studies on the deleterious functional impact of anaemia among 411young adolescent school girls, Gujarat, India. Standard methods were used between 10-14 years of adolescent girls. The result was the prevalence of iron deficiency was 67%. It is a higher incidence rate.

Sumenet. et. Al., (2006) conducted a cross sectional study to screen out the healthy pattern of the adolescent girls in the age group of 10-14 years. N=110, diet survey and haemoglobin level was assessed. The results showed that less than 10% were having normal hemoglobin level others are anaemic the haemoglobin level is between 6 to 11.9 gm/dl($p<0.05$)

Chaudhry. SM., (2008) conducted a study on anaemia among adolescent females in the urban area of Nagpur, Maharastra in India. A cross sectional survey was conducted among 296 adolescent girls 10-19 years. The results were the prevalence of anaemia among adolescent females was found to be 35.1%.

Kramipour.R., (2008) A Cross sectional study was conducted on prevalence of iron deficiency anaemia among adolescent school girls from Kermanshah, West Iran. The result was 47 girls 12.2% with iron deficiency anemia.

Tussing Humphreys, LM., (2009) conducted a study on iron deficiency anemia among adolescent girls in Bangladesh. The sample size was 355 adolescent girls. The result was iron deficiency anaemia has 24.8% of adolescent girls.

Al-Sayes, et. al. (2011) conducted a study to determine the prevalence of iron deficiency and iron deficiency anaemia among apparently healthy Saudi young female university students studying at King Abdulaziz University in Jeddah. 310 blood samples were collected from the students. Their age ranged between 11 to18 years and it was found that 25.9% of students had a deficient iron store and 23.9% of students had iron deficiency anaemia.

Literature related to factors influencing iron absorption

Zijip., (2000) conducted a study the effect of tea and other dietary factor on iron absorption. He says that absorption enhanced by ascorbic acid and meat, fish and poultry. The following recommendations are made to increase home iron intake, Increase meal time ascorbic acid intake, and fortified food with iron. Recommendations with respect to tea consumption include, consume tea between meals instead of during the meals, and simultaneously consume ascorbic acid, acid, fish and poultry.

Fishman, et. al., (2000) investigated a systematic review of vitamin supplementation trials that reported changes in anemia or iron status. Resume of the study shows vitamin A can improve hematological indicators and enhance the efficacy of iron supplementation based data showing it is efficacy in reducing anemia or iron deficiency.

Skeaff, et. al (2001) investigated the efficacy of a dietary regimen involving increased consumption of iron-rich foods with ascorbic acid and enhances of iron absorption and decreased consumption of inhibitors of iron absorption and a low dose iron supplement for increasing iron stores in young adult women with mild iron deficiency. The investigator concluded that

intensive dietary program has the potential to improve the iron status of women with iron deficiency.

Geerlings, et. al., (2003) conducted a community based randomized controlled trial to assess the effects of cooking in iron, aluminum cooking pots in Malawian households in an area with high malaria prevalence. They concluded that consumption of food prepared in iron cooking pots shows a significant rise in hemoglobin after 6 weeks use. Using an iron cooking pots in developing countries could provide an innovative way to prevent iron deficiency anemia in malaria areas where regular iron supplementation is problematic.

Hashizume, et. al (2004) conducted a cross sectional study of 97 school aged children living in Kzyl-Orda to investigate anemia related to the sufficiency of dietary iron intake. The researcher concluded that the low bioavailability of dietary iron seems related to anemia in the region. Although iron fortification or supplementation programs can be useful for promoting the anemia prevention control program.

Literature related to the treatment of anemia

Vijayalakshmi, et. al (2000)conducted a true experimental study to assess the bio availability of iron from mug beans and its effect on the nutritional status of adolescent girls, at Mulaivail, Karur. 150 samples were selected among the age group of 12-18 years. The anthropometric measurement and serum hemoglobin, iron binding capacity tests were done for them. The intervention was given for about 20 days oral iron. Before the intervention the mean value of hemoglobin was 9.1 gm/dl and after the intervention was 11.3gm/dl. There was a significant difference in the hemoglobin level ($p<0.001$).

NalwadeVijaya. et. al., (2001) conducted a quasi-experimental study to assess the nutritional intervention for iron and vitamin A deficiency among 70 adolescent girls, between the age group of 10-18 years in Parbhani. Anthropometric measures, clinical signs and symptoms of nutritional deficiency disorders were assessed and 7 hours recall method was used to assess the food

intake of the girls. Iron and vitamin A supplementation were supplemented to them for 90 days, which post test was done. At the end of the study there was a decrease in the prevalence of anemia (48%) vitamin A deficiency (28.11%) among the experimental group. However, in the control group there were significant differences. There was a significant improvement seen ($p<0.001$) after the interventions.

Swarnalatha. et. al (2001) conducted an experimental study to assess the impact of iron, vitamin A and vitamin C supplementation on anemic adolescent girls at Sri Narayana higher secondary school, Ullipudhur. Hundred samples were selected among the age group of 13-15 years. The findings showed that initially overall 35.7 percent adolescent girls were anemic. Mild and severe anemia in 2% of the subjects. At the end the study overall 26.72 percent adolescent girls were anemic, 9.2 % were mildly anemic and severe anemia in 0.98% of the subjects. There was a significant improvement seen after the intervention ($p<0.05$).

Brady. et. al (2003) conducted a clinical study on iron supplementation and absorption in the presence and absence of ascorbic acid. The study revealed that fortification with ascorbic acid increases the bio availability in both presence and absence of inhibiting substances (coco, caffeine items). Ascorbic acid contains micro encapsulation with Lecithin, which birds and protect the iron particles from the action of inhibiting substances (84%) when a human takes the iron supplements along with ascorbic acid helps to get the higher amount of iron absorption ($p=0.02$).

Juinil., (2005) was conducted a clinical correlation study on the impact of vitamins in iron absorption among 200 adolescent girls. Hemoglobin and serum retinol studies were done for the samples. The study revealed that there is an observed correlation between serum retinol and hemoglobin levels. The girls with a low serum retinol concentration are more likely to have iron-deficiency anaemia (76.1%), compared to those with normal to high levels of retinol

(24.9%). While vitamin A deficiency has an adverse effect on hemoglobin synthesis, even a slight increase in vitamin A intake can lead to a significant rise in hemoglobin levels ($p<0.001$). However, vitamin A is less effective in alleviating severe iron-deficiency anemia. Without doubt, low levels of iron in the body cannot be relieved by vitamin A supplementation alone. Ascorbic acid plays an important role in modulating ferritin synthesis iron storage.

Literature related to the effectiveness of orange juice and elemental iron supplementation

Balay. KS, et. al., (2004) studied 21 children, ages 4.0 to 7.9 years using a randomized crossover design. Subjects consumed a small meal including a muffin containing 4 mg Fe as ferrous fumarate and either apple (no ascorbic acid) or orange juice (25 mg ascorbic acid). They were separately given a reference dose of Fe (ferrous sulfate) with ascorbic acid. Iron absorption , increased from 5.5% +/- 0.7% to 8.2% +/- 1.2%, $P < 0.001$ from the muffins given with orange juice compared with muffins given with apple juice. The absorption of ferrous fumarate given with orange juice and enhancement of absorption by the presence of juice were significantly positively related to height, weight, and age ($P < 0.01$ for each). Although iron absorption from ferrous fumarate given with apple juice was significantly inversely associated with the (log transformed) serum ferritin, the difference in absorption between juice types was not ($P > 0.9$). They conclude overall benefit to iron absorption from ferrous fumarate provided with orange juice. There was a nearly 2-fold increase in iron absorption from ferrous fumarate given with orange juice.

Amyzhu. et. al., (2012) have conducted Evaluation and Treatment of Iron Deficiency Anemia as the first-line treatment for IDA, oral iron is safe, cost-effective, and convenient. Ferrous sulfate and ferrous gluconate are the two preferred oral preparations of iron, given the low cost and good bioavailability of elemental iron. To optimize iron absorption, ferrous salts should be taken with

orange juice, since iron is better absorbed in an acidic environment. Furthermore, ascorbic acid reduces the oxidation of ferrous to ferric iron.

The American society for clinical nutrition, (1979) measure iron absorption in children from meals containing apple juice or orange juice. Hypothesized that iron absorption would be greater with orange juice due to its higher ascorbic acid content than that of apple juice. On two successive days, children consumed identical meals which included apple juice, one day and orange juice on the other, in random order. Iron absorption was measured from the red blood cell incorporation of the iron stable isotopes 14 days later. 25 healthy children were recruited, of whom 21 (11 male, 10 female) completed the study. Results show Median iron absorption from the meal ingested with apple juice was 7.2% (mean +- standard deviation, 9.5 +- 9.7%). Median iron absorption from the meal ingested with orange juice was 7.8% (9.8 +- 6.7%, p = 0.44). Iron absorption from the meal that included apple juice was significantly correlated with serum ferritin concentration (p = 0.02); iron absorption from the meal that included orange juice tended to correlate with serum transferring receptor concentration (p = 0.051). They conclude orange is effective than apple.

Carlos Albert., (2003) studied that different fortified foods have been used for the control of iron-deficiency anaemia in children. To evaluate the usefulness of fortified orange juice, 50 preschool children enrolled in a day-care center in the town of Pontal, Southeast Brazil, received two flasks of 200 ml orange juice fortified with 20 mg ferrous sulfate, from Monday to Friday for 4 months. Capillary haemoglobin and z scores of the anthropometric indicators, weight-for-age, weight-for-height and height-for-age were determined at the beginning of the study and after 4 months. Mean haemoglobin increased from 10.48 ± 1.66 to 11.60 ± 1.09 mg/dl (p = 0.00003) and the prevalence of anaemia (Hb< 11 mg/dl) decreased from 60 to 20%. The acceptance of fortified juice was excellent and no undesired effect was observed. Conclude that the consumption of iron-fortified orange juice is an adequate strategy to complement iron intake in preschool children and, therefore, to treat and prevent iron-deficiency anaemia.

2.2. CONCEPTUAL FRAME WORK

A Conceptual framework is a process of ideas which are framed and utilized for the development of a research design. It helps the researcher to know what data needs to be collected and gives direction to an entire research process.

The study is based on the concept that administration of 50 ml of orange juice with elemental iron to adolescent girls will improve hemoglobin level. The investigator adopted the Wiedenbach's Helping Art of Clinical Nursing Theory (1964) as a base for developing the conceptual framework. ErnestinWidenbach proposes helping the art of clinical nursing theory in 1964 for nursing which describes a desired situation and way to attain it. It directs action towards the explicit goal.

THIS THEORY HAS 3 FACTORS

1) Central purpose
2) Prescription
3) Realities

1) **Central purpose**

It refers to what the nurse wants to accomplish. It is the overall goal towards which a nurse strives.

2) Prescription

It refers to the plan of care for clients. It will specify the nature of action that will fulfill the nurse's central purpose.

3) Realities

It refers to the physical, physiological, emotional and spiritual factors that come into play in situation involving nursing action. The five realities identified by Wiedenbach's are agent, recipient, goal, means and framework.

The conceptual framework of the nursing practice according to this theory consists of three steps as followed:

Step I : Identifying the need for help

Step II : Ministering the needed help

Step III : Validating that the need for help was met.

Step I: Identifying the need for help

This step involves determining the need for help. The anaemic adolescent girls were identified based on demographic variables, inclusive and exclusive criteria, simple random sampling technique was used to assign the patients in experimental and control group.

Step II: Ministering the needed help

50 ml of orange juice with elemental iron was given to experimental group daily in the afternoon.

Agent	:	Investigator
Recipient	:	Anemic adolescent girls
Goal	:	To improve hemoglobin level
Means	:	25 ml of orange juice
Framework	:	Selected schools at choolai, Chennai.

Step-III: Validating that need for help was met.

It is accomplished by means of post assessment of haemoglobin level. It is followed by an analysis of the findings.

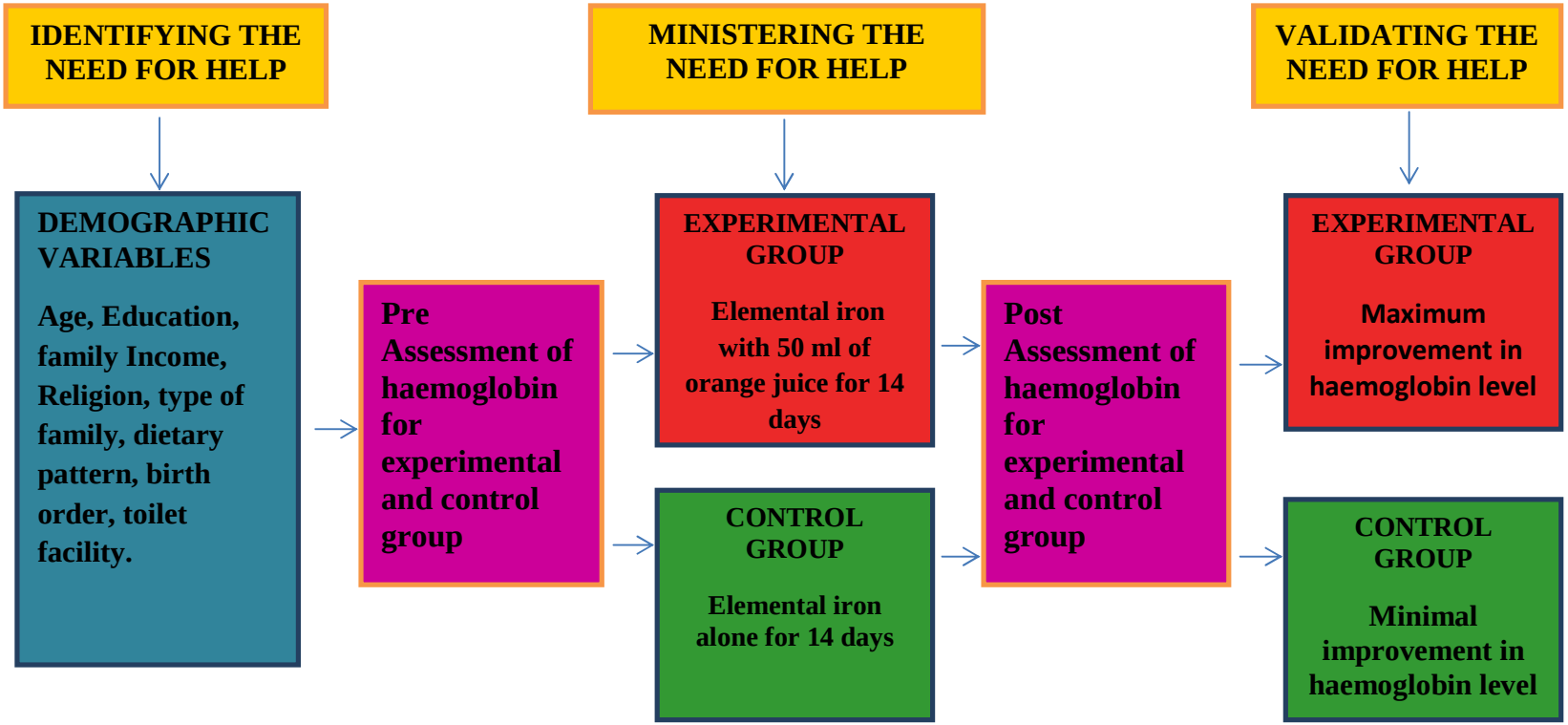


Fig-1: conceptual framework based on modified model of wiedenbach's helping art of clinical nursing theory (1964)

CHAPTER-III
RESEARCH METHODOLOGY

Research methodology provides a brief description of the method adopted by the investigator in the present study and it refers to the principles and ideas on which researcher bases their procedures and strategies. This chapter deals with the description of the methods and different steps used for collecting and organizing data such as the research approach, research design, variables, setting of the study, population, sample, sample size, sampling technique, criteria for sample selection, developing and description of tool, ethical consideration, content validity, pilot study, reliability, data collection procedure and plan for data analysis. The present study was done to assess the effectiveness of orange juice with elemental iron versus elemental iron supplementation to increase the level of haemoglobin on anaemia among adolescent Girls in selected Schools of Choolai, Chennai.

3.1 RESEARCH APPROACH

A research approach guides the researcher in the nature of data to be collected and the method of analysis. To accomplish the objectives of the current study quantitative research approach was chosen by the investigator.

3.2 RESEARCH DESIGN

Research design is overall plans for obtaining answers to the research questions or for testing the research hypothesis. The investigator has chosen the experimental research design.

Pre-test, Post-test (before, after) Control group design.

RE	O1	X1	O2
RC	O3	-	O4

R - Randomization

E - Experimental Group

C - Control Group

X - Intervention

O - Observation

Table:1 Pretest- posttest (before, after) Control group design

Group	Pretest O1	Treatment X	Post testO2
Experimental Group (Group-I)	Hemoglobin level assessed	50ml of orange juice with elemental iron	Hemoglobin level assessed
Control Group (Group-II)	Hemoglobin level assessed	Elemental iron alone	Hemoglobin level assessed

3.3 RESEARCH VARIABLES

Variables included in the study are,

Dependent Variable : Haemoglobin level

Independent Variable : Elemental iron and orange juice

Demographic Variables : Age, education, religion, family income, type of family, dietary pattern, birth order, toilet facility, etc..

3.4 SETTING OF THE STUDY

The study was conducted in selected schools of Choolai, Chennai, 4 kms away from the College of Nursing, Madras Medical College, Chennai. It has 9 zones and covers the population of 54,500. The College of Nursing, Madras Medical College provides curative and preventive care to the people through students belonging to Department. The setting was selected based on the feasibility of conducting the study, availability of sampling and proximity of setting to the investigator.

3.5 POPULATION

The study population comprises of adolescent girls (10-14 years) of age, in selected schools, Choolai.

3.6 SAMPLE

A subset of the population was selected to participate in the study. The study sample comprised of adolescent girls who fulfilled the inclusion and exclusion criteria**.**

3.7 SAMPLE SIZE

In this study the sample size comprises of 60 adolescent girls in selected schools of Choolai, in which 30 were in experimental and 30 were in control group.

3.8 SAMPLING TECHNIQUE

Simple random sampling technique was used for the study. The researcher conducted a survey in the selected schools of Choolai, Chennai. The list of adolescent girls with anaemia without any other diseases were collected with the total of 93 adolescent girls, using lottery method 60 samples were selected (Experimental group 30 and Control group 30) from the sampling frame based on the inclusion and exclusion criteria.

3.9 CRITERIA FOR SAMPLE SELECTION

Inclusion criteria

1. The early adolescent girls age group of 10-14 yrs.
2. The adolescent girls who were available at the time of data collection.
3. The adolescent girls who were willing to participate.
4. The adolescent girls with the haemoglobin level less than 12gm/dl.

Exclusion criteria

1. The adolescent girls who were not willing to participate.
2. Who is having any systemic disease, bleeding disorder.

3.10 DEVELOPMENT AND DESCRIPTION OF THE TOOL

A structured interview schedule was developed by the investigator, based on the objectives of the study and the tool was developed after an extensive review of literature, net sources and opinion of the experts in the field, journals and books.

3.10.1 Description of the tool

The instrument consists of three sections. The tool used in this study was an interview and observation schedule on haemoglobin for adolescent girls.

Section-A: Demographic data of adolescent girls which consists of 9 questions such as age, education, family income, religion, type of family, dietary pattern, birth order, toilet facility, wearing foot wear.

Section-B: Menstrual history of the adolescent girls which consists of 5 questions such as age at menarche, menstrual cycle, associated with clots, frequency, and menstrual flow.

Section-C: Observation schedule includes pre-test assessment of hemoglobin level of both experimental and control group and there after post interventional assessment of hemoglobin level for both the group.

HEMOGLOBIN ASSESSMENT

The investigator is to assess and record haemoglobin level before and after administration of Orange juice and T. Ferrous sulfate 335 mg.

Table 2: **Assessment of hemoglobin level**

Week/ Date	Procedure	Hemoglobin level in gm/dl	
		Pre Test	Post Test
First week			
Day 1	Hemoglobin checked		
Second week			
Day 15	Hemoglobin checked		

Results

1) Maximum improvement in hemoglobin level : up to 2g/dl
2) Minimum improvement in hemoglobin level : up to 1g/dl

3.11 ETHICAL CONSIDERATION

Ethical consideration refers to a system of moral values that is concerned with the degree to which research procedure adheres to professional, legal and social obligations to study participants.

The study objectives, intervention, and data collection procedures were approved by the research and ethical committee of the institution. Informed consent was obtained from parents of adolescent girls. The freedom was given to the client to leave the study at his/her will without assigning any reason. No routine work was altered or withheld. Confidentiality of the subject's information was maintained.

3.12 TESTING OF THE TOOL

Content Validity

The content validity refers to the degree to which an instrument measures what is supposed to measure. The content of the tool was validated by one Medical Expert, and one Community Health Nursing Expert. The expert's suggestions were incorporated and the tool was finalized and used by the investigator for the main study.

Pilot study

The pilot study was conducted at selected schools at Choolai, Chennai, by obtaining prior permission from the authorities and conducted with ten adolescent girls, who fulfilled the inclusion criteria. The subjects who were used for the pilot study conducted were excluded for the main study. The data related to the variables were collected. The pre and post assessment of hemoglobin level was

assessed to both the groups. Orange juice 50ml with elemental iron was given to the experimental group for 14 days daily by the investigator in person. Results were analyzed. The investigator found that the instrument was feasible to use and further no modifications were needed before the actual implementation of the study.

Reliability of the tool

The reliability of the tool was established by inter rater reliability method. The obtained reliability correlation coefficient was high (r=0.90).

3.13 DATA COLLECTION PROCEDURE

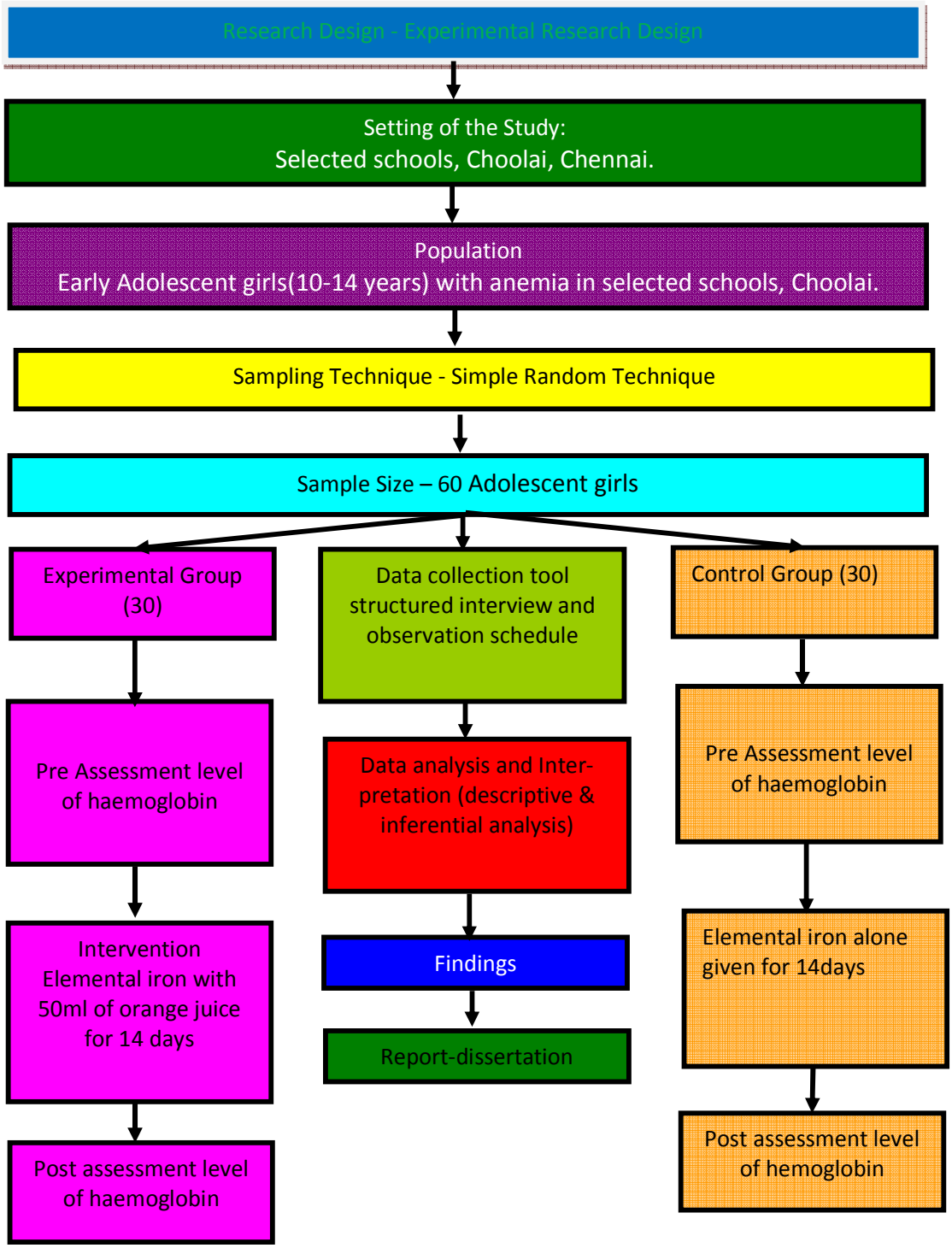
The study was conducted in selected urban schools of Choolai, Chennai, after obtaining permission from the Joint Commissioner, Corporation of Chennai, Assistant elementary education officer, and medical officer of the Choolai Health Post. A self-introduction was given by the investigator and the informed written consent was obtained from the parents of adolescent girls and benefits of orange were explained to the participants. The objectives and purpose of study was explained and confidentiality was maintained. Before starting the procedure

T. Albendazole 400mg was given. The data collection procedure was done for a period of 4 weeks and the time taken for data collection from each adolescent girls was 10-15 mts and 5-10 mts for doing blood test for each girl and the investigator selected 60 samples (30 participants in experimental and 30 in the control group) by simple random sampling technique using lottery method based on the inclusion and exclusion criteria. Pretest haemoglobin level was assessed by sahli method in both groups, for experimental group 50 ml of orange juice with elemental iron was given in experimental group, elemental iron alone for control group in the afternoon after lunch daily in person for 14 days and post assessment was conducted on 15^{th} day in both experimental and control group.

3.14 PLAN FOR DATA ANALYSIS

Data analysis enables the researcher to reduce, summarize, organize, evaluate, interpret and communicate numerical information to obtain answer to research questions. Data analysis was done based on the objectives of the study. The data were analyzed using descriptive statistics like frequency distribution, percentage and inferential statistics like standard deviation, chi-square test, independent t-test, dependent t-test. The significant findings were expressed in the form of tables and figures. $P<0.05$ was considered statistically significant.

Figure-2: Schematic representation of research methodology



CHAPTER-IV
DATA ANALYSIS AND INTERPRETATION

This chapter deals with the analysis and interpretation of collected data from 60 samples of adolescent girls with anaemia to evaluate the effectiveness of orange juice with elemental iron on improvement of hemoglobin level among adolescent girls with anemia studying corporation schools at Choolai, Chennai.

ORGANIZATION OF DATA

The findings of the study were grouped and analyzed under the following sections.

Section-A : Frequency and percentage distribution of demographic variables, menstrual history of adolescent girls in the experimental and control group.

Section-B : Assessment of pre-test hemoglobin level among adolescent girls in experimental and control group.

Section-C : Assessment of post-test hemoglobin level among adolescent girls in experimental and control group.

Section-D : Compare the experimental and control group haemoglobin among adolescent girls.

Section-E : Effectiveness of orange juice with elemental iron comparing elemental iron supplementation alone.

Section-F : Association between the level of hemoglobin gain and their demographic variables, menstrual history in experimental and control group.

Section-A

Table 3: Frequency and percentage distribution of adolescent girls demographic variables N=60

Demographic variables		Group			
		Group I		Group II	
		N	%	n	%
Age	10 -12 yrs	13	43.3%	14	46.7%
	13 -14 yrs	17	56.7%	16	53.3%
Education	7th std	12	40.0%	13	43.3%
	8th std	18	60.0%	17	56.7%
Family income	< Rs.1589	10	33.3%	9	30.0%
	Rs.1590 -4726	14	46.7%	11	36.7%
	Rs.4727 -7877	6	20.0%	10	33.3%
Religion	Hindu	20	66.7%	18	60.0%
	Muslim	4	13.3%	5	16.7%
	Christian	6	20.0%	7	23.3%
Type of family	Nuclear family	10	33.3%	12	40.0%
	Joint family	20	66.7%	18	60.0%
Dietary pattern	Vegetarian	3	10.0%	2	6.7%
	Non vegetarian	27	90.0%	28	93.3%
Birth order	One	6	20.0%	4	13.3%
	Two	14	46.7%	16	53.3%
	Three	8	26.6%	7	23.4%
	> Three	2	6.7%	3	10.0%
Toilet facility	Yes	11	37.9%	14	46.7%
	No	18	62.1%	16	53.3%
footwear-while going to the toilet	Yes	13	43.3%	15	50.0%
	No	17	56.7%	15	50.0%

The above table reveals the demographic variables of adolescent girls who were participated in this study, among the participants majority of them were belongs to the age group of 13-14 yrs, 56.7 %(17) in group I, 53.3%(16) in group II. According to the educational status majority of them were studying 8^{th} std, 60.0 %(18) in group I, 56.7%(17) in group II. Based on the family income most of them were having family income around Rs.1590-4726 in group I 46.7% (14), in group II 36.7% (11). Based on religion most of them belongs to Hindu, 66.7% (20)in group I, 60% (18) in group II. According to the type of family majority of them are in joint family, in group I 66.7% (20), in group II 60% (18). On dietary practice majority of them were practicing non vegetarian, 90% (27) in group I, 93.3% (28) in group II. Based on birth order majority of them were in second child, in group I 46.7%(14), in group II 53.3%(16). In case of toilet facility in their house majority of them was not having, in group I 62.1% (18), in group II 53.3%(16). Majority of them were not wearing foot wear while going to toilet, in group I 56.7%(17), in group II half of them are not wearing 50.0%(15) and half of them are wearing 50.0%(15).

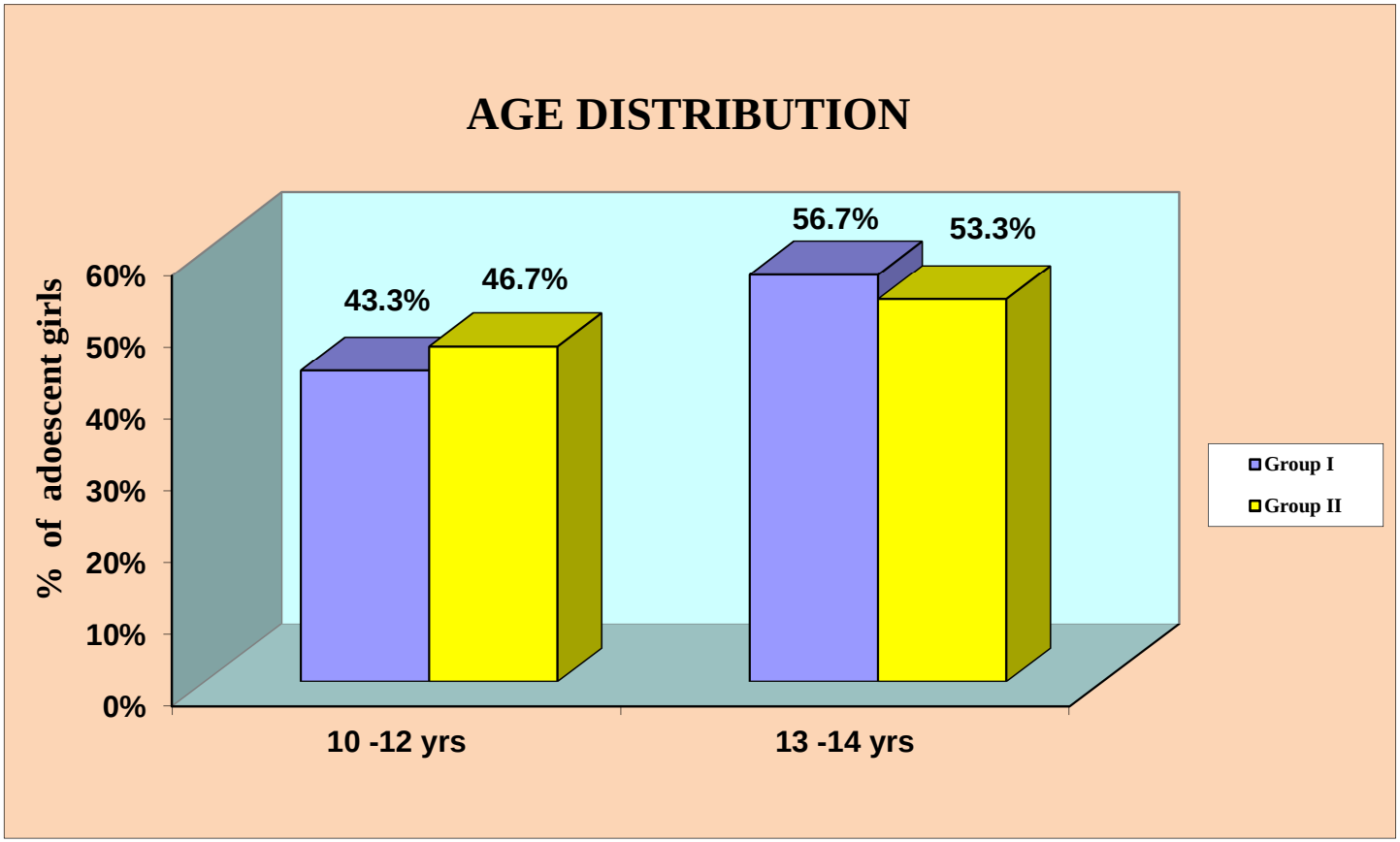


Figure-3: Frequency and percentage of Age distribution

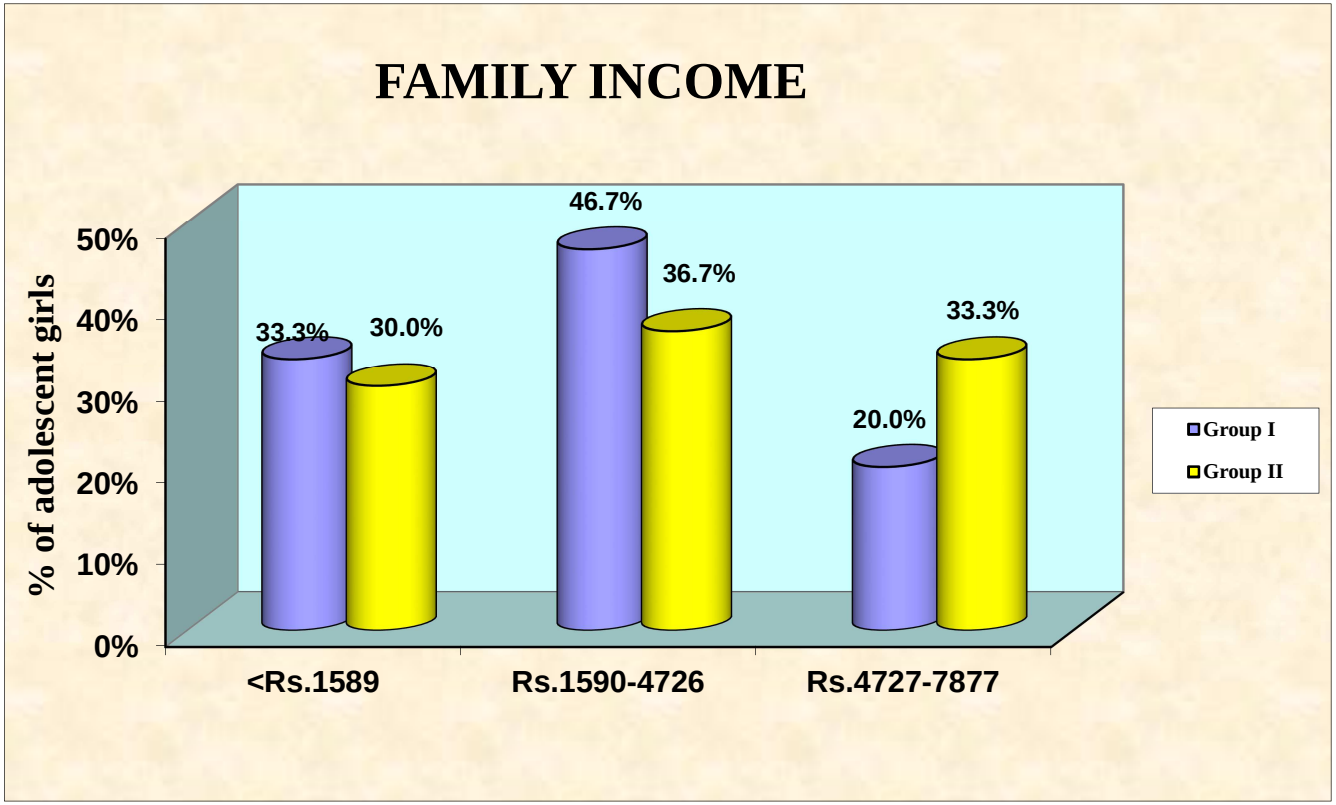


Figure-4: Frequency and percentage of family income distribution

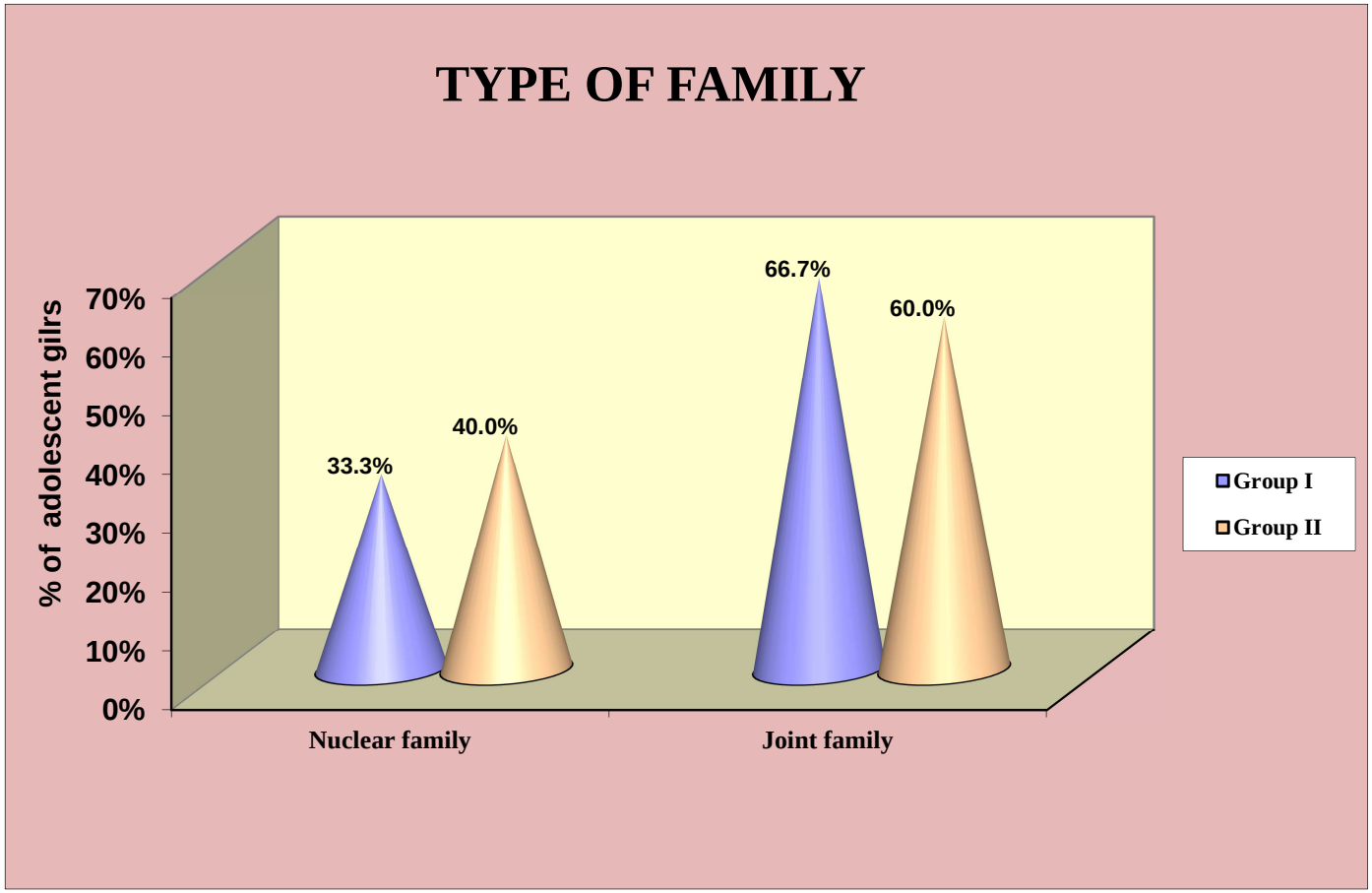


Figure5: Frequency and percentage of type of family

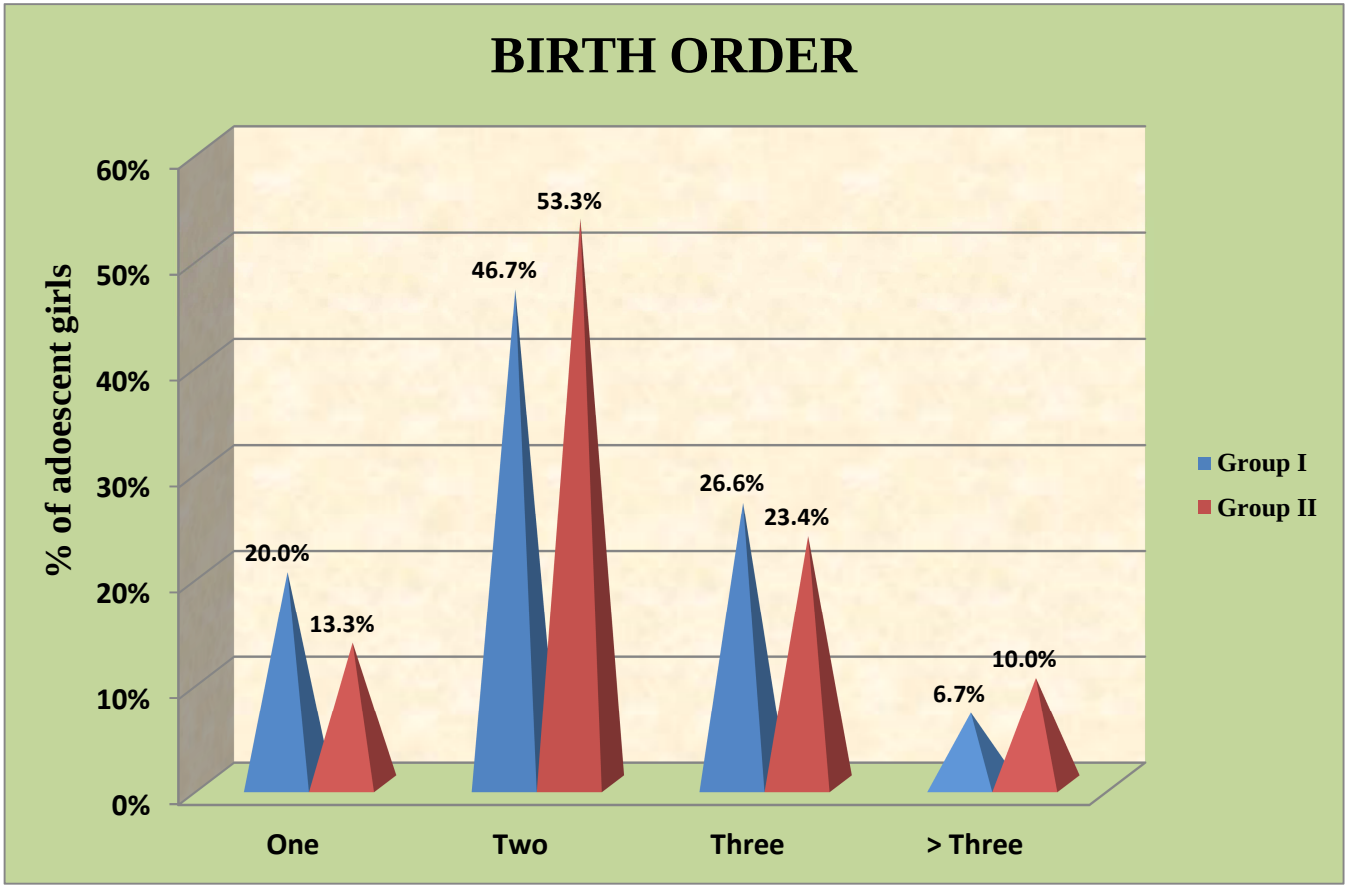


Figure-6: Frequency and percentage of birth order

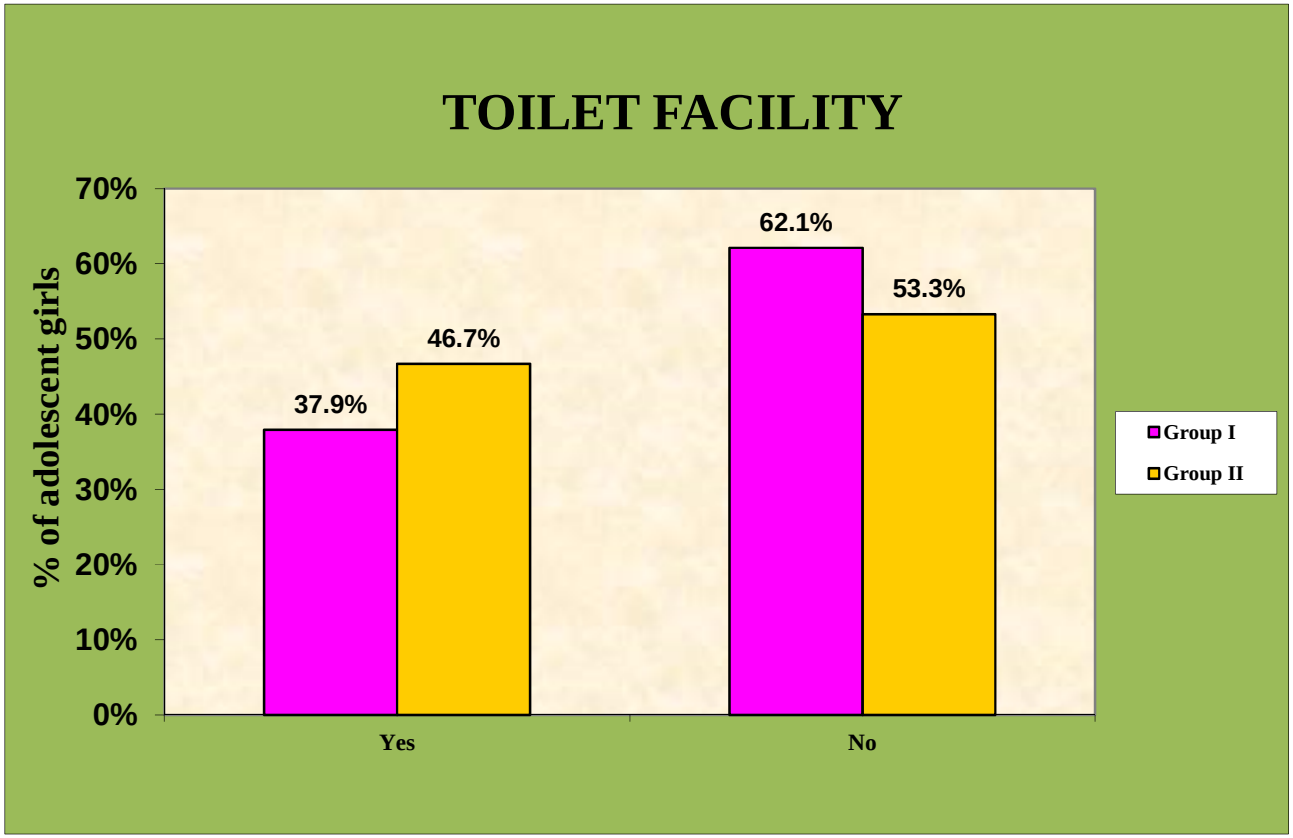


Figure-7: Frequency and percentage of toilet facility

Table 4: Menstrual history of adolescent girls.

Menstrual history		Group			
		Group I		Group II	
		N	%	n	%
Age at Menarche	8 -10 yrs	9	30.0%	11	36.7%
	11 -12 yrs	19	63.3%	17	56.6%
	13 -14 yrs	2	6.7%	2	6.7%
Menstrual cycles	Regular	17	56.7%	19	63.3%
	Irregular	13	43.3%	11	36.7%
Associated with clots	Yes	11	36.7%	14	46.7%
	No	19	63.3%	16	53.3%
Frequency	21 -35 days	22	73.3%	19	63.3%
	More than 35 days	8	26.7%	11	36.7%
No of Days	< 3days	6	20.0%	8	26.7%
	3 -7 days	20	66.7%	19	63.3%
	> 7 days	4	13.3%	3	10.0%

The above table reveals menstrual history of the adolescent girls who were participated in this study, among the participants majority of them attained menarche at the age group of 11-12 years in group I 63.3 %(19), group II 56.6 % (17). In case of menstrual cycle most of them are had regular cycles, in group I 56.7 %(17), group II 63.3 %(19). Menstrual flow associated with clots majority of them were not associated with clots, in group I 63.3 %(19), group II 53.3 %(16). Frequency of the menstrual cycle is majority of them are falling in 21-35 days, in group I 73.3 %(22), group II 63.3 %(19). Number of days in menstrual flow majority of them are getting 3-7 days, in group I 66.7 %(20), group II 63.3 %(19).

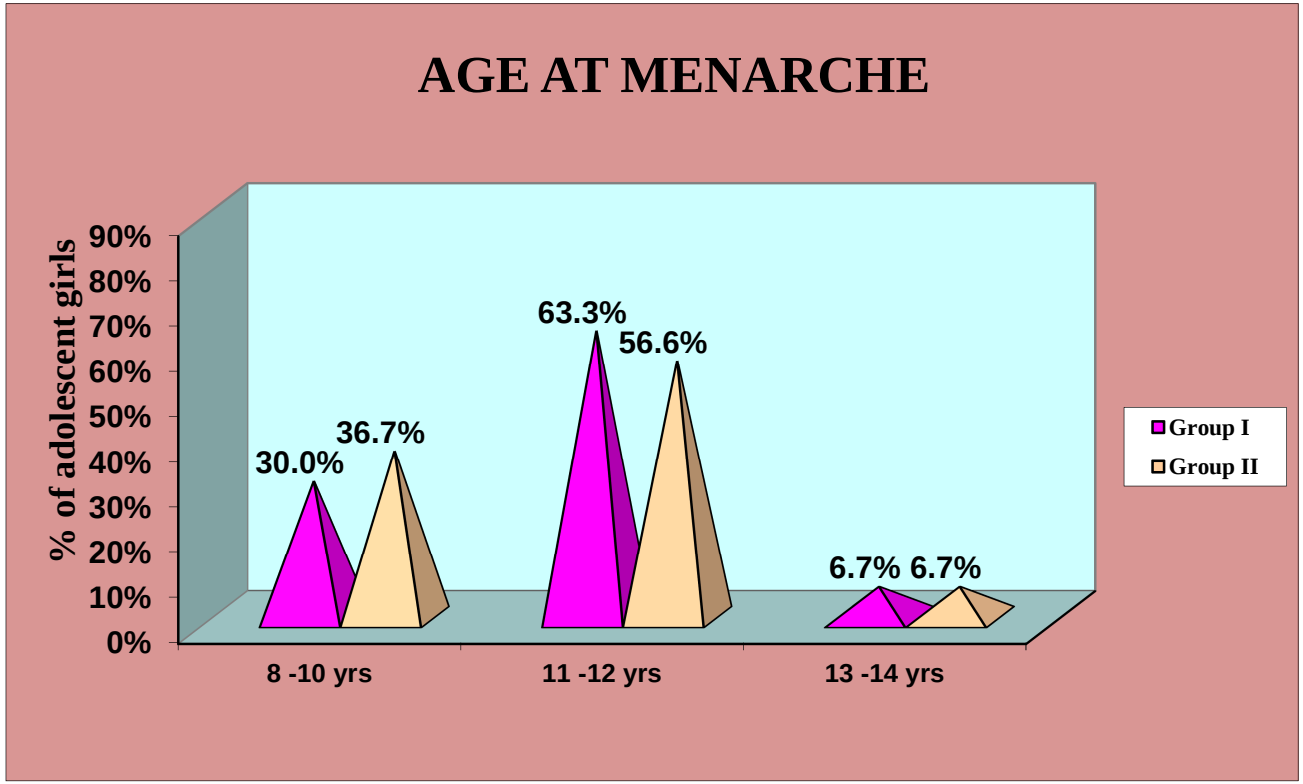


Figure-8: Frequency and percentage of age at menarche

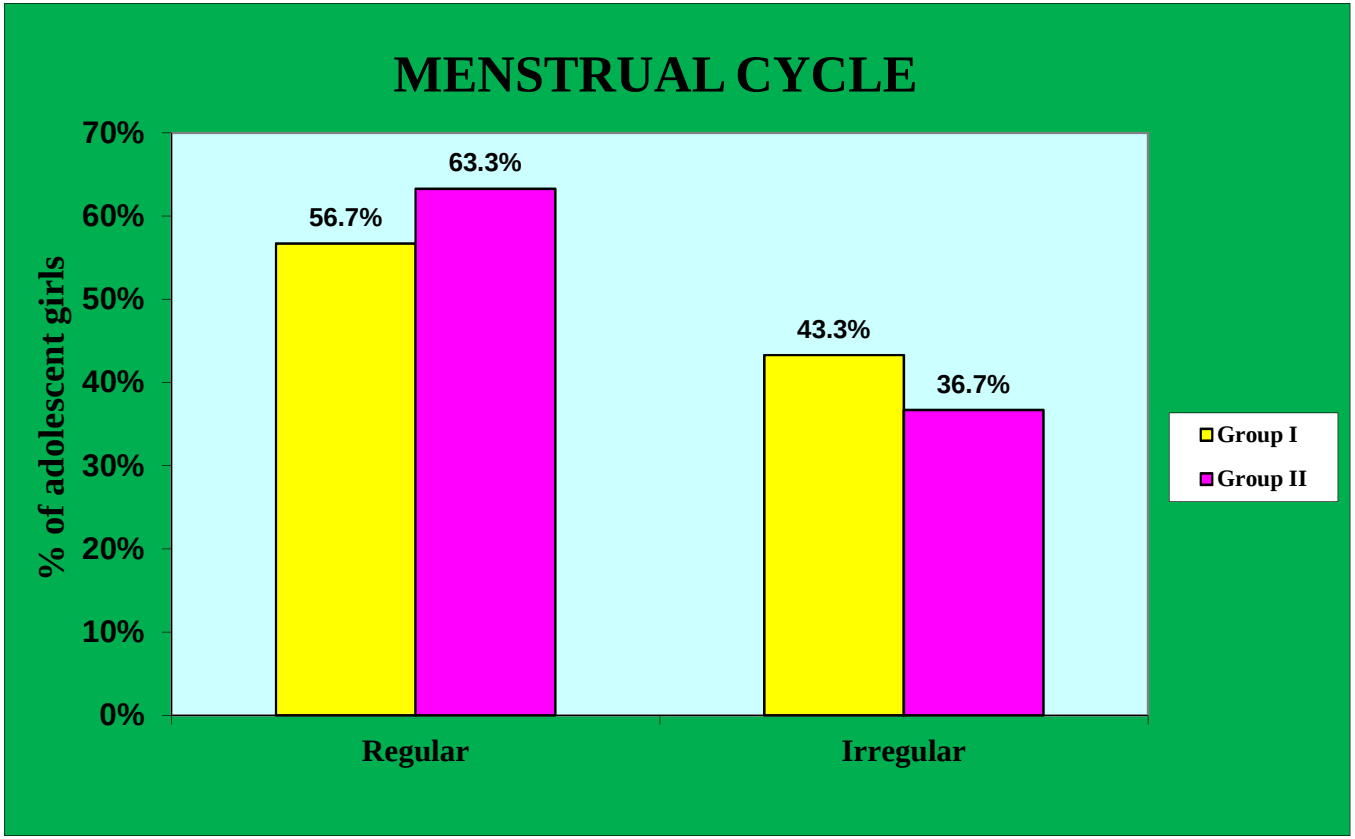


Figure-9: Frequency percentage of menstrual cycle

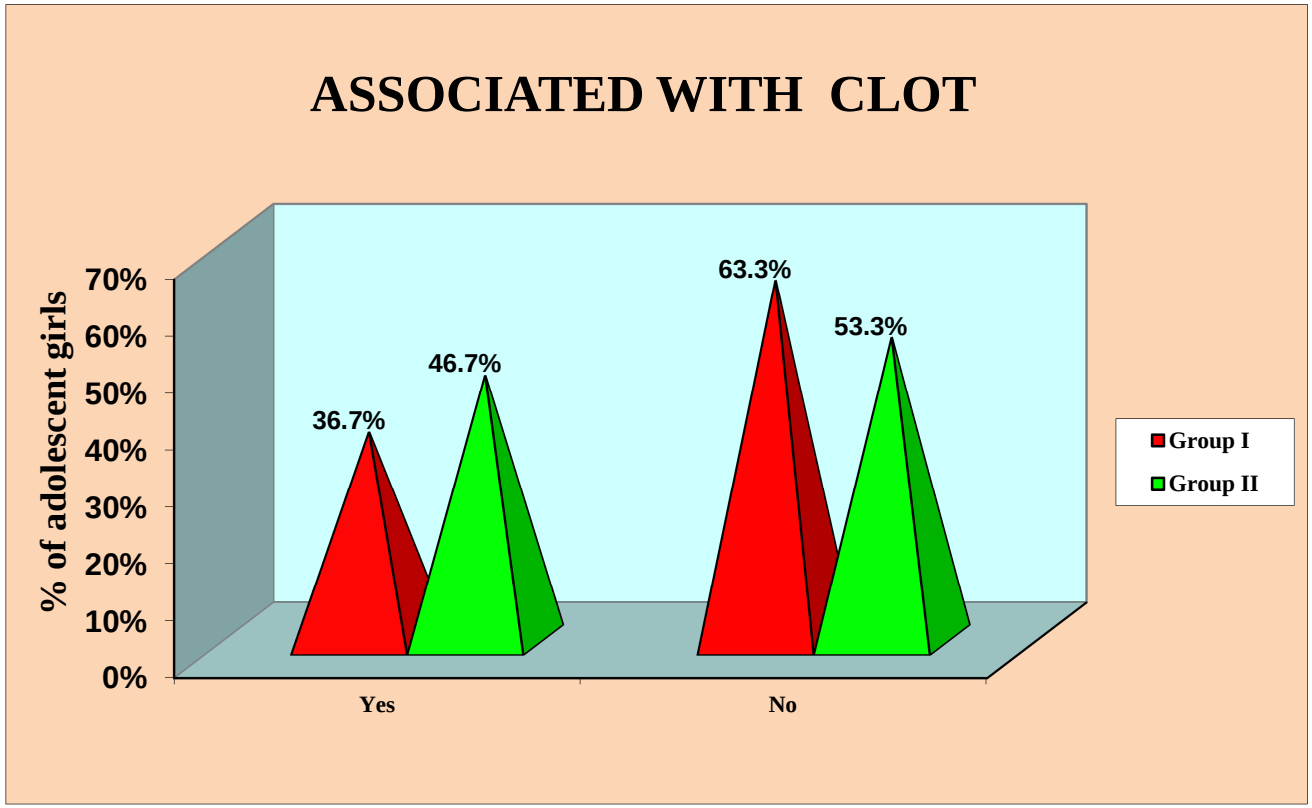


Figure-10: Frequency and percentage of menstrual flow associated with clots

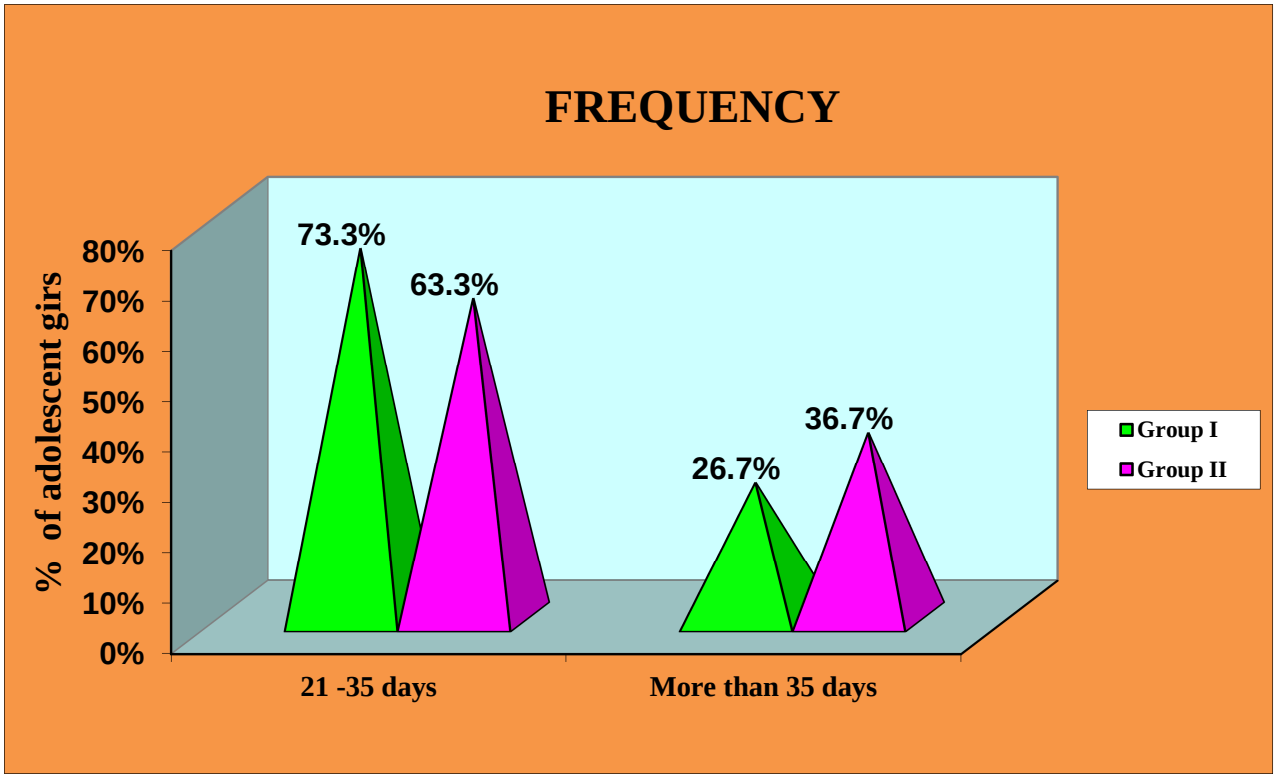


Figure-11: Frequency and percentage of frequency of menstrual flow

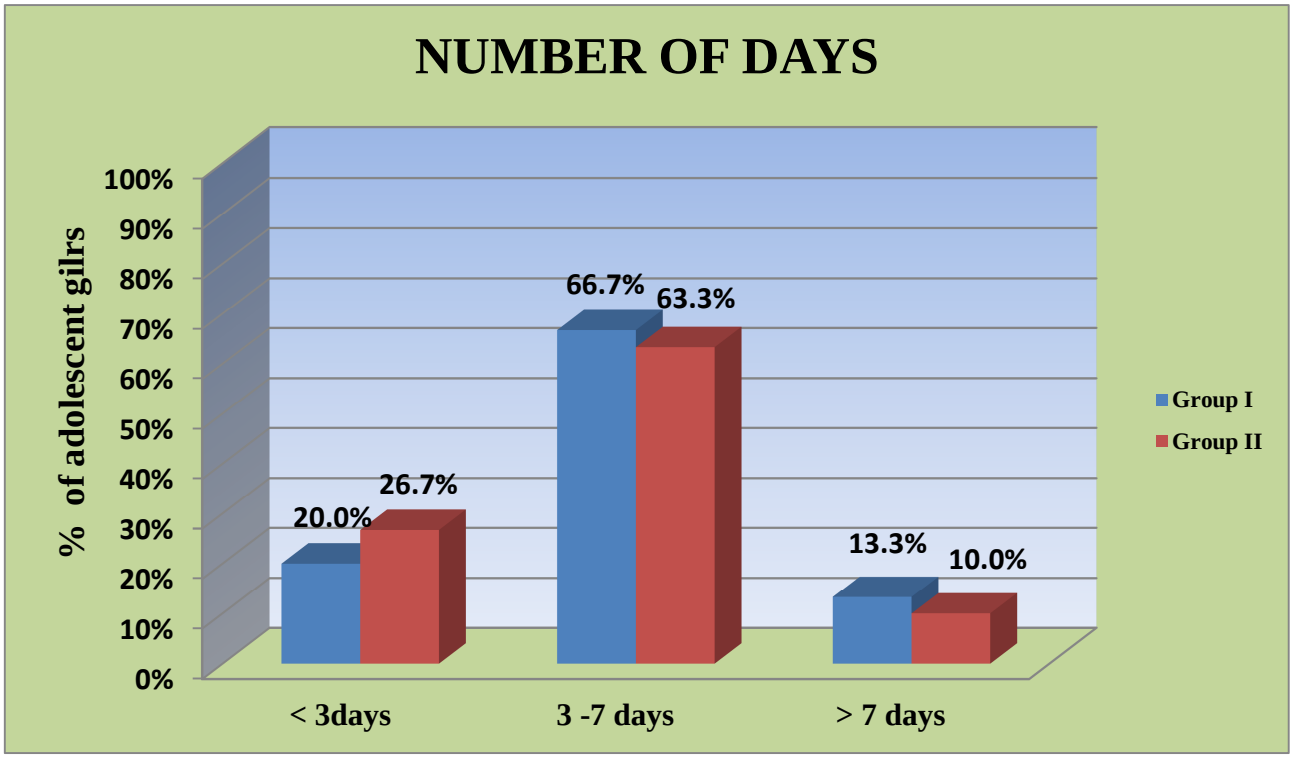


Figure-12: Frequency and percentage of number of days of menstrual flow

Section-B

Table 5: Assessment of pretest haemoglobin level among adolescent girls in experimental and Control group.

Level of Hemoglobin	Group I		Group II	
	N	%	n	%
Normal	**0**	**0.0%**	**0**	**0.0%**
Mild anemia	**13**	**43.3%**	**15**	**50.0%**
Moderate anemia	**17**	**56.7%**	**15**	**50.0%**
Severe anemia	**0**	**0.0%**	**0**	**0.0%**
Total	**30**	**100.0 %**	**30**	**100.0%**

The above table reveals that, the pretest level of haemoglobin among the adolescent girls both group I and group II. In Group I, 43.3 %(13) were having mild anemia, 56.7% (17) were having moderate anemia. In Group II, 50.0% (15) were having mild anemia, 50.0 %(15) were having moderate anemia.

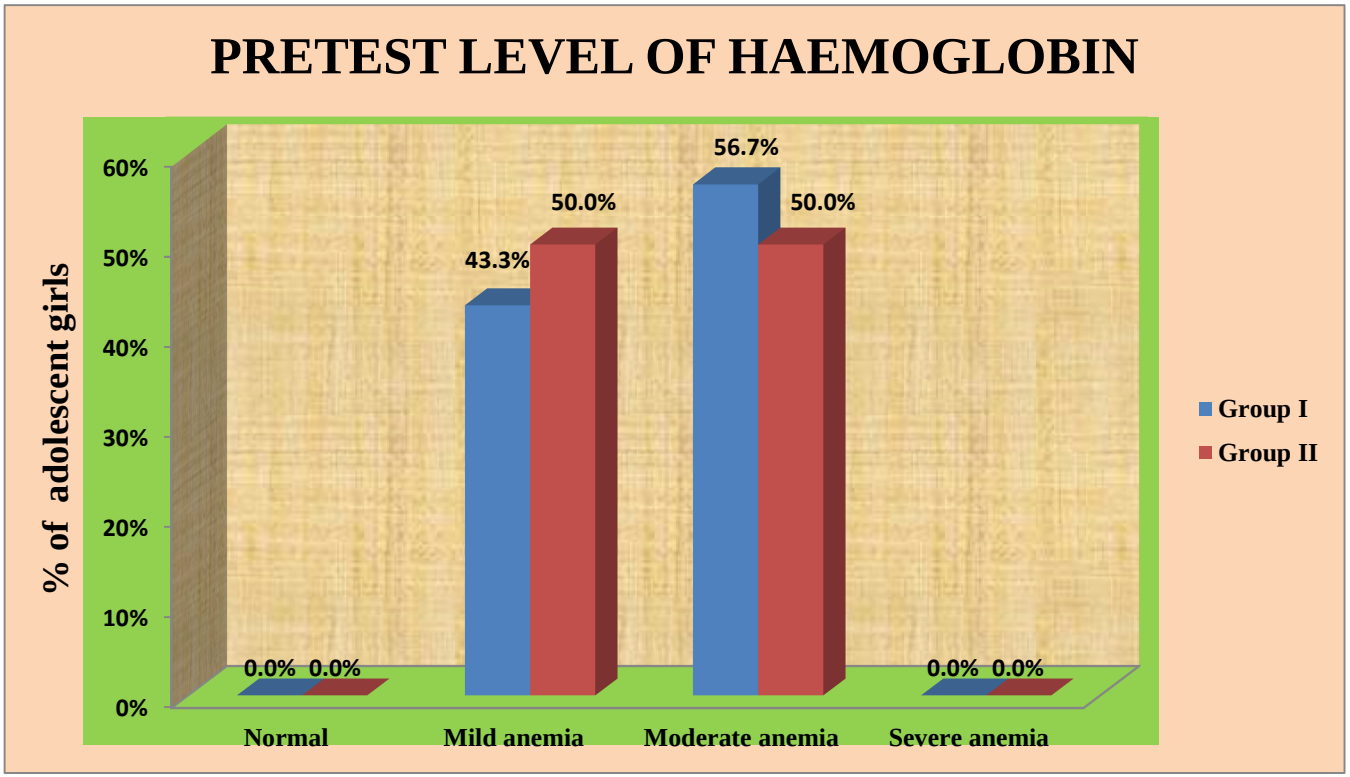


Figure-13: Frequency percentage of pretest haemoglobin level

Section C

Table 6: Assessment of posttest level of hemoglobin among adolescent girls in experimental and Control group

Level of Haemoglobin	Group I		Group II	
	N	%	N	%
Normal	**5**	**16.7%**	**0**	**0.0%**
Mild anaemia	**20**	**66.6%**	**19**	**63.3%**
Moderate anaemia	**5**	**16.7%**	**11**	**36.7%**
Severe anaemia	**0**	**0.0%**	**0**	**0.0%**
Total	**30**	**100.0%**	**30**	**100.0%**

The above table reveals that, the posttest level of haemoglobin among adolescent girls both group I and group II. In Group I, 16.7% (5) were having a normal level of Haemoglobin, 66. 6%(20) were having mild anaemia, 16.7%(5) were having moderate anaemia. In Group II, 63.3%(19) were having mild anaemia, 36.7% (11) were having moderate anaemia.

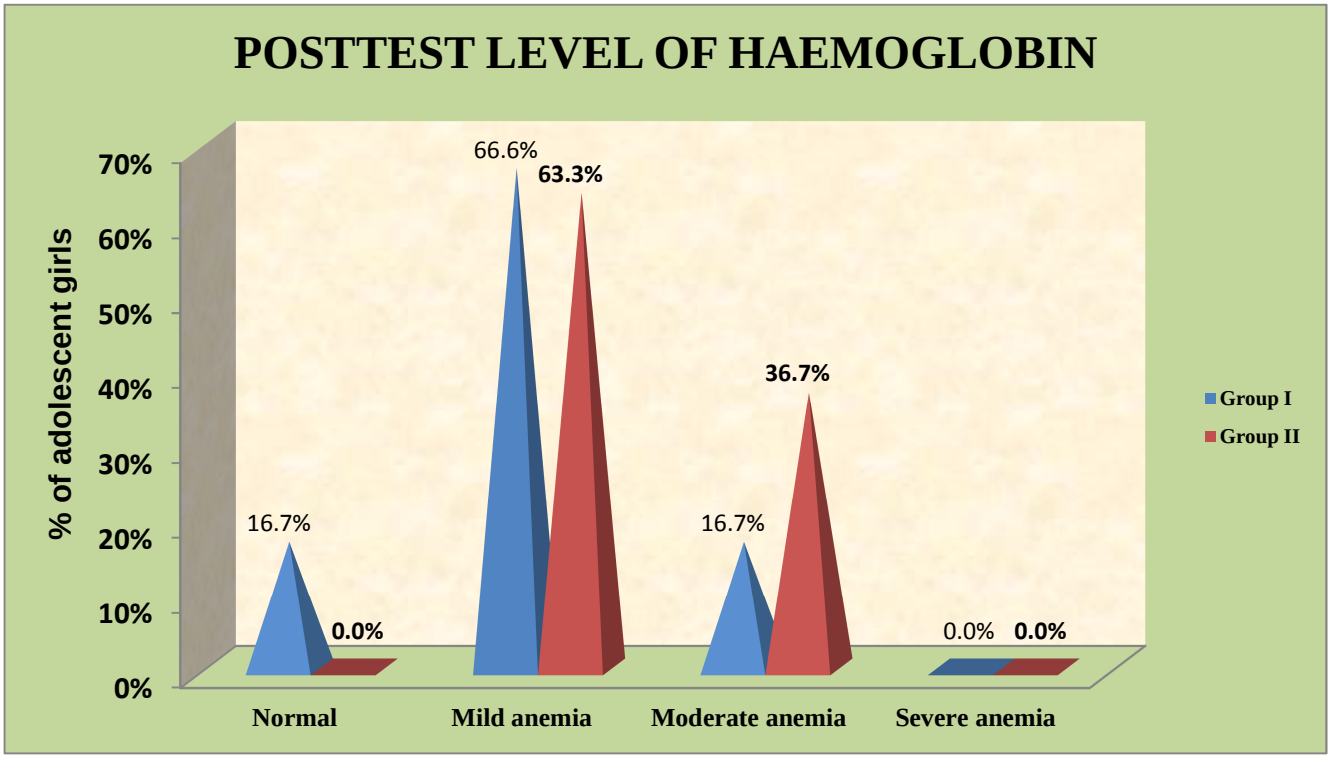


Figure-14: Frequency percentage of posttest haemoglobin level

Section-D

Table 7: Comparison of group I and group II haemoglobin

	No. of adolescent Girls	Group I		Group II		Student's Independent t-test
		Mean	SD	Mean	SD	
Pretest	30	9.84	0.95	9.96	0.88	t=0.50 P=0.61
Posttest	30	10.98	0.86	10.44	0.90	**t=2.38 P=0.02***

* Significant at P≤0.05 ** highly significant at P≤0.01 *** very high significant at P≤0.001

The above table shows that, the haemoglobin level In pretest, Experimental group, the mean haemoglobin was 9.84gm/dl and control group the mean haemoglobin was 9.96 gm/dl, so the difference is 0.12 , this difference is small and it is not statistically significant difference, t=0.50P=0.61. In posttest, Experimental group, the mean haemoglobin was 10.98 gm/dl and control group the mean haemoglobin was 10.44 gm/dl level of haemoglobin, so the difference is 0.46, this difference is large and it is a statistically significant difference. Statistical significance was calculated using student's independent t-test **t=2.38P=0.02***

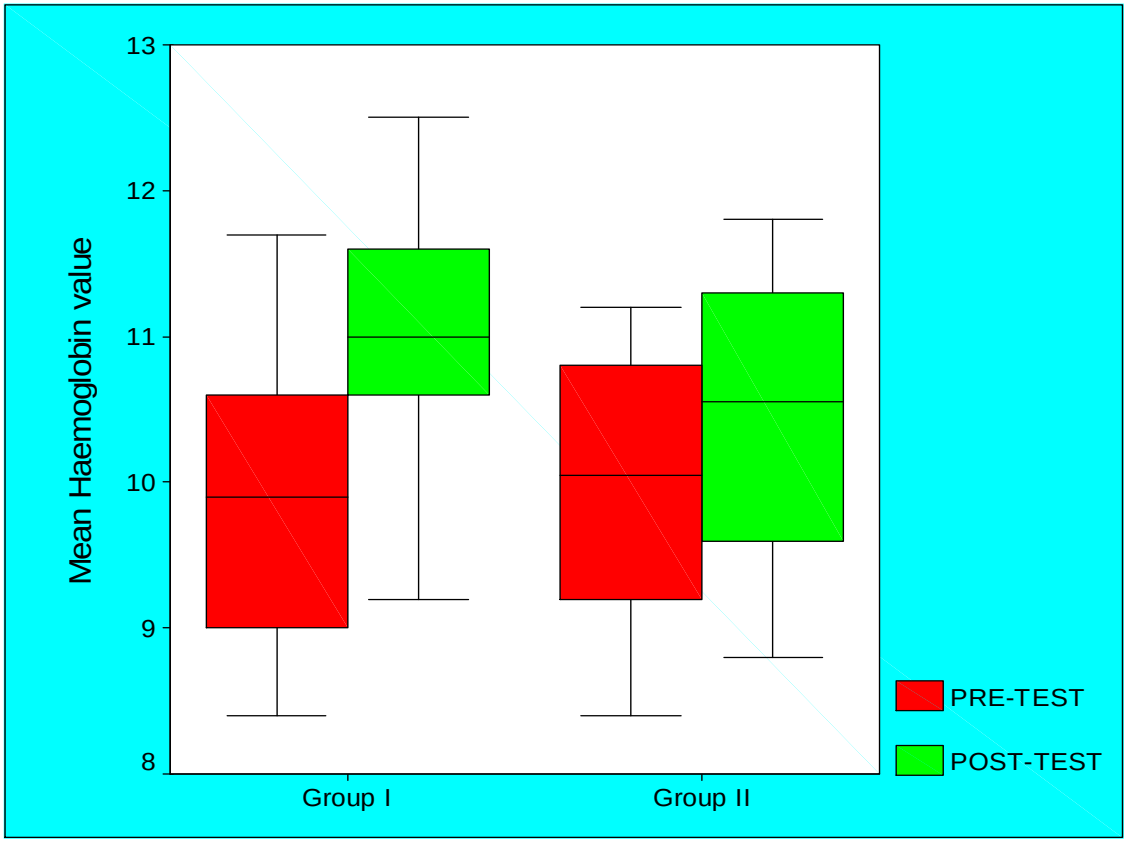


Figure 15: Comparison of pretest and posttest haemoglobin level

Table 8: comparison of pretest and posttest mean haemoglobin

	No. of adolescent Girls	PRETEST		POSTTEST		Student's paired t-test
		Mean	SD	Mean	SD	
Group I	30	9.84	0.95	10.98	0.85	t=14.21P=0.001***
Group II	30	9.96	0.88	10.44	0.90	t=1.99P=0.05*

* Significant at P≤0.05 ** highly significant at P≤0.01 *** very high significant at P≤0.001

The above table reveals that, comparison of pretest, posttest haemoglobin level on an average, in Experimental group, the pretest mean haemoglobin was 9.84gm/dl and the posttest mean haemoglobin was 10.98gm/dl, P=0.001***, so it was statistically very highly significant. In the Control group, the pretest mean haemoglobin was 9.96gm/dl and the posttest mean haemoglobin was 10.44gm/dl, P=0.05*, so it was statistically significant. These results shows that, Orange juice with elemental iron supplementation was very highly significant compare with elemental iron supplementation alone. Hence the hypothesis H2: There will be a significant difference between pre and posttest mean haemoglobin among adolescent girls was accepted.

Table 9: Level of anemia between experimental and control group

	Level of anemia	Experiment		Control		Chi square test
		N	%	n	%	
Pretest	Normal	**0**	**0.0%**	**0**	**0.0%**	$\chi 2=0.27$
	Mild anemia	**13**	**43.3%**	**15**	**50.0%**	P=0.60 DF=1
	Moderate anemia	**17**	**56.7%**	**15**	**50.0%**	Not significant
	Severe anemia	**0**	**0.0%**	**0**	**0.0%**	
	Total	**30**	**100.0%**	**30**	**100.0%**	
Posttest	Normal	**5**	**16.7%**	**0**	**0.0%**	$\chi 2=7.28$
	Mild anemia	**20**	**66.6%**	**19**	**63.3%**	P=0.03* DF=2
	Moderate anemia	**5**	**16.7%**	**11**	**36.7%**	Significant
	Severe anemia	**0**	**0.0%**	**0**	**0.0%**	
	Total	**30**	**100.0%**	**30**	**100.0%**	

* significant at P≤0.05 ** highly significant at P≤0.01 *** very high significant at P≤0.001

The above table reveals that, the level of anaemia in the experimental and control group, In pretest, Group I, 43.3% (13) were having mild anaemia, 56.7 %(17) were having moderate anaemia. In Group II, 50.0% (15) were having mild anemia, 50.0 % (15) were having moderate anaemia. ($\chi 2=0.27$P=0.60 DF=1) it is statistically not significant.In posttest, Group I, 16.7% (5) were having normal Haemoglobin, 66.6% (20) were having mild anaemia, and 16.7% (5) were having

moderate anaemia. Group II, 63.3% (19) were having mild anaemia, 36.7% (11) were having moderate anaemia. (χ2=7.28P=0.03* DF=2) it is statistically Significance. Statistical significance was calculated using chi-square test.

Section-E

Table 10: Effectiveness of orange juice with elemental iron comparing with elemental iron supplementation alone.

Group	**Test**	Mean Score	Mean difference with 95% Confidence interval	Percentage difference from baseline with 95% Confidence interval
Experiment	**Pretest**	9.84	1.14 (0.98-1.30)	**11.5 % (9.6%-13.2%)**
	Posttest	10.98		
Control	**Pretest**	9.96	0.48(0.01—0.97)	**4.8 % (0.1%-9.7%)**
	Posttest	10.44		

The above table reveals that, the mean haemoglobin between experiment and control group, In experimental group, the pretest mean haemoglobin score was 9.84 gm/dl, the posttest mean haemoglobin score was 10.98 gm/dl. The mean difference with 95% Confidence interval was 1.14, and the Percentage difference from baseline with 95% Confidence interval was 11.5%. In the control group, the pretest mean haemoglobin score was 9.96 gm/dl, the posttest mean haemoglobin score was 10.44 gm/dl. The mean difference with 95% Confidence interval was 0.48, and the Percentage difference from baseline with 95% Confidence interval was 4.8%. These difference shows that, the effectiveness was more in orange juice with elemental iron than elemental iron supplementation alone.

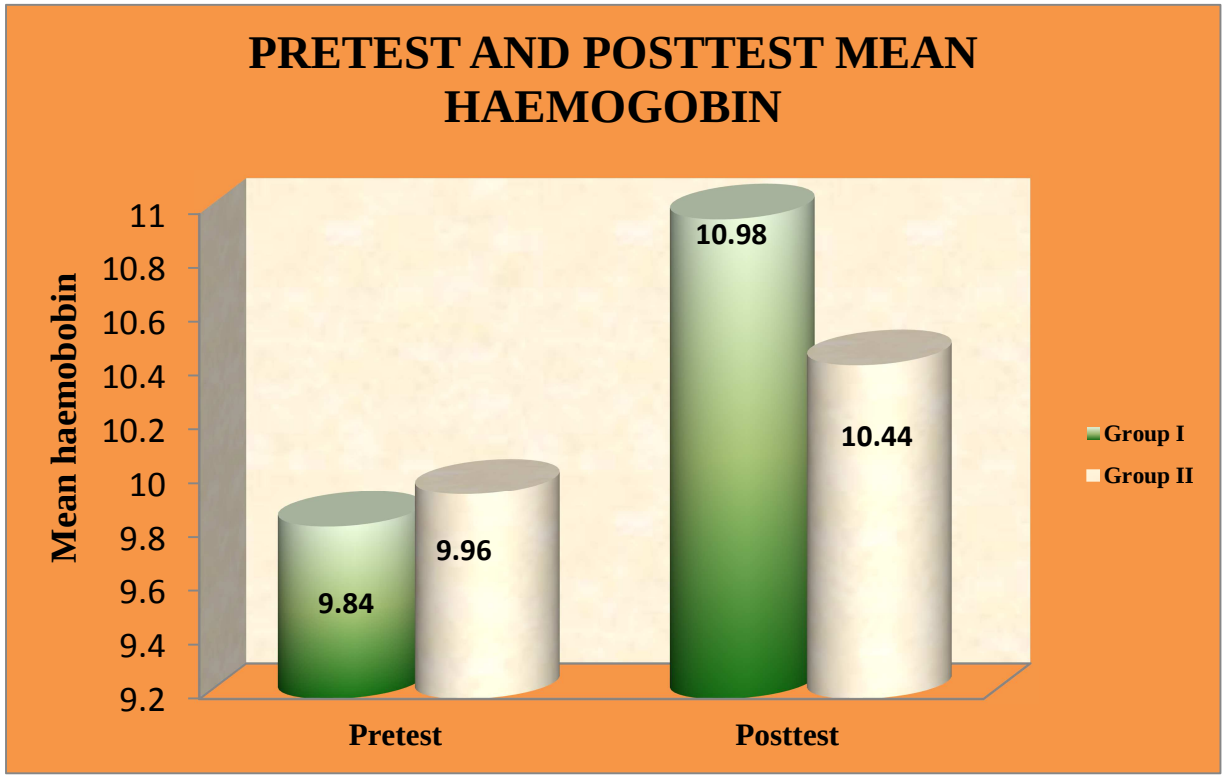


Figure-16: Pretest and posttest mean hemoglobin

Section -F

Table 11: Association between level of Hemoglobin gain and demographic variables (Group I)

Demographic variables		Level of haemoglobin gain					
		Below average(<1.14)		Above average(>1.14)			
		N	%	N	%	Total	Chi square test
Age	10 -12 yrs	4	30.8%	9	69.2%	13	χ^2=1.15P=0.28
	13 -14 yrs	11	64.7%	6	35.3%	17	
Education	7th std	5	41.7%	7	58.3%	12	χ^2=1.15P=0.28
	8th std	10	55.6%	8	44.4%	18	
Family income	< Rs.1589	8	80.0%	2	20.0%	10	**χ^2=6.55P=0.04***
	Rs.1590 - 4726	6	42.8%	8	57.2%	14	
	Rs.4727 -7877	1	16.7%	5	83.3%	6	
Religion	Hindu	9	45.0%	11	55.0%	20	χ^2=4.86P=0.09
	Muslim	4	100.0%			4	
	Christian	2	33.3%	4	66.7%	6	
Type of family	Nuclear family	2	20.0%	8	80.0%	10	**χ^2=5.40P=0.02***
	Joint family	13	65.0%	7	35.0%	20	
Dietary pattern	Vegetarian			3	100.0%	3	χ^2=3.33P=0.07
	Non vegetarian	15	55.6%	12	44.4%	27	
Birth order	One	4	66.7%	2	33.3%	6	χ^2=3.45P=0.33
	Two	6	42.9%	8	57.1%	14	
	Three	3	37.5%	5	62.5%	8	
	> Three	2	100.0%			2	
Toilet facility	Yes	7	63.6%	4	36.4%	11	χ^2=1.01P=0.32
	No	8	44.4%	10	55.6%	18	
Wearing - foot wear	Yes	8	61.5%	5	38.5%	13	χ^2=1.22P=0.26
	No	7	41.2%	10	58.8%	17	

The above table reveals that those in More income (**χ2=6.55P=0.04*)**, nuclear families(**χ2=5.40P=0.02*)** of adolescent girls gained more Hemoglobin. Statistical significance was calculated using chi square test. This study analysis revealed that there was a significant effect of elemental iron given with orange juice on improving blood haemoglobin level among adolescent girls. Hence the hypothesis H3: There will be significant association between the mean difference in haemoglobin level and a selected demographic variable among adolescent girls in experimental group was accepted.

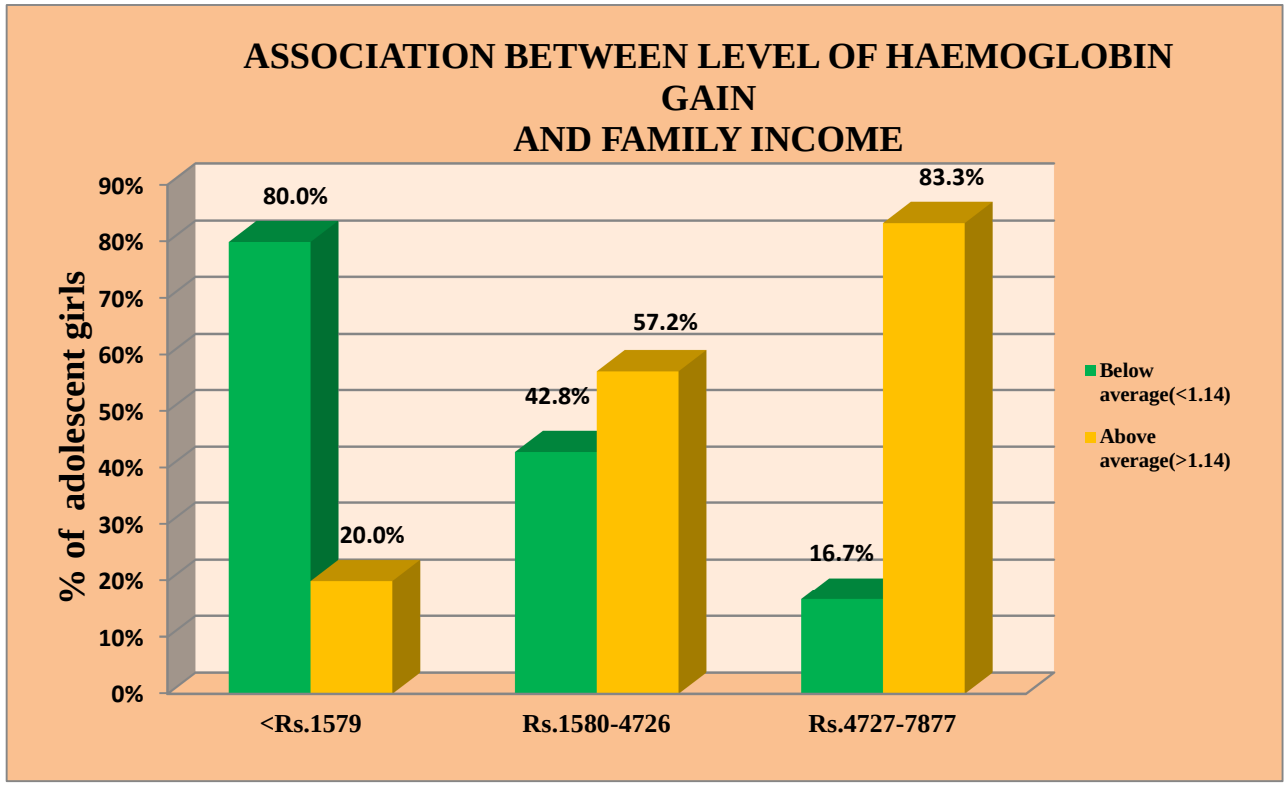


Figure-17: Association between levels of hemoglobin gain and their family income.

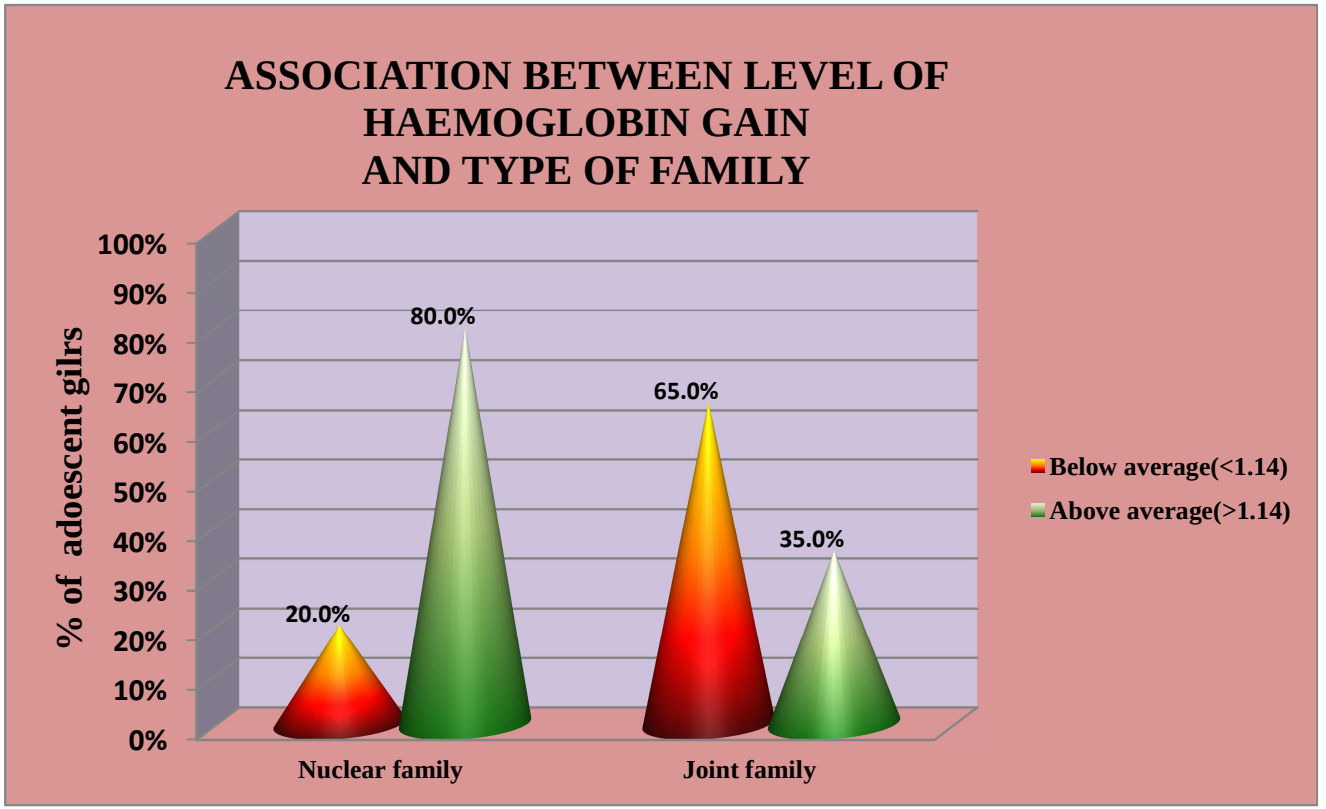


Figure-18: association between levels of haemoglobin gain and their type of family.

Table 12: Association between level of Haemoglobin gain and menstrual history (Group I)

Menstrual history		Level of haemoglobin gain					Chi square test
		Below average(<1.14)		Above average(>1.14)			
		N	%	n	%	Total	
Age at Menarche	8 -10 yrs	3	33.3%	6	66.7%	9	$\chi 2=3.05$ P=0.22
	11 -12 yrs	10	52.6%	9	47.4%	19	
	13 -14 yrs	2	100.0%			2	
Menstrual cycles	Regular	5	29.4%	12	70.6%	17	**$\chi 2=6.65$ P=0.01****
	Irregular	10	76.9%	3	23.1%	13	
Associated with clots	Yes	8	72.7%	3	27.3%	11	$\chi 2=3.58$ P=0.07
	No	7	36.8%	12	63.2%	19	
Frequency	21 -35 days	8	36.3%	14	64.7%	22	**$\chi 2=6.14$ P=0.01****
	More than 35 days	7	87.5%	1	12.5%	8	
No of Days	< 3days	2	33.3%	4	66.7%	6	$\chi 2=1.67$ P=0.43
	3 -7 days	10	50.0%	10	50.0%	20	
	> 7 days	3	75.0%	1	25.0%	4	

* significant at P≤0.05 ** highly significant at P≤0.01 *** very high significant at P≤0.001

The above table elicits that, the association between hemoglobin gain and their menstrual history of adolescent girls. Those who had regular menstrual cycle (**$\chi 2=6.65$ P=0.01****) and 21-35 days frequency (**$\chi 2=6.14$ P=0.01****) of menstrual adolescent girls gain more Hemoglobin. Statistical significance was calculated using chi square test.

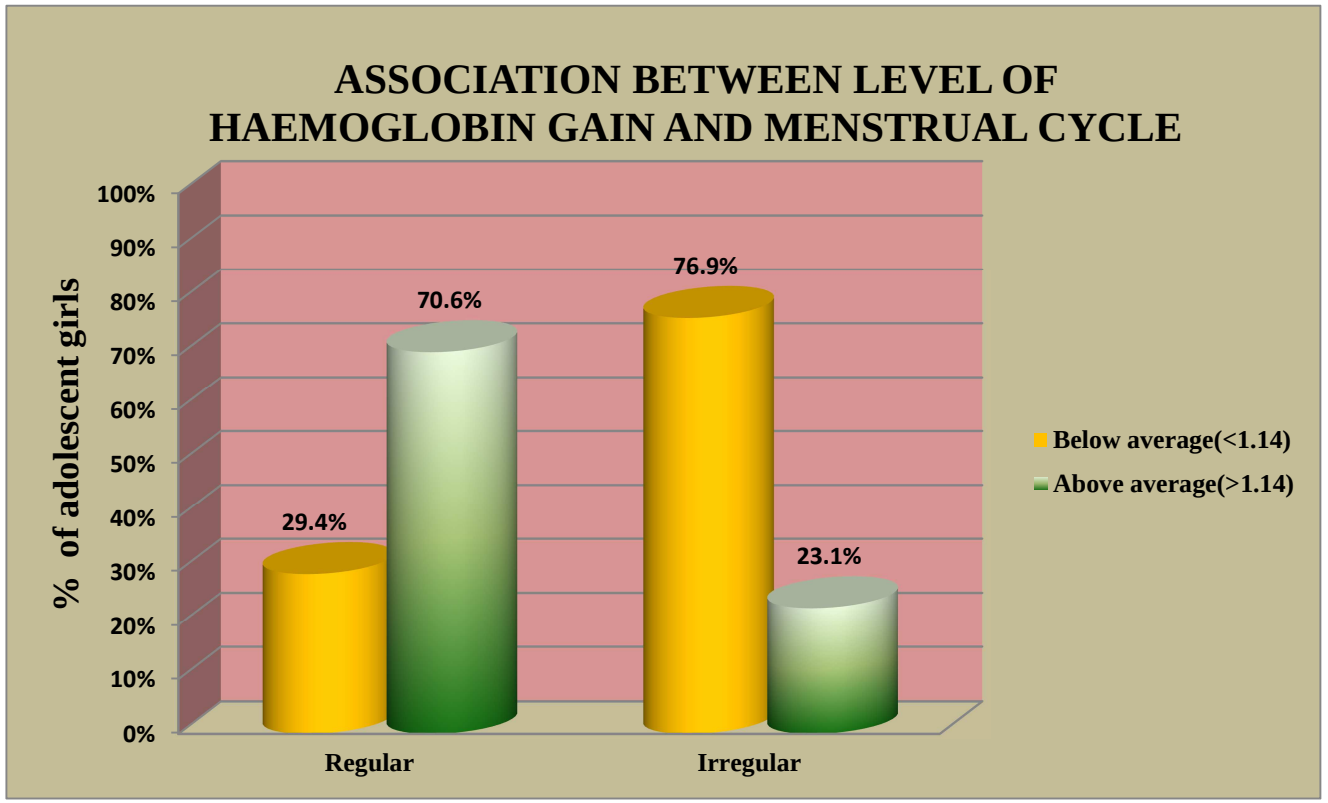


Figure-19: association between levels of hemoglobin gain and their menstrual cycle.

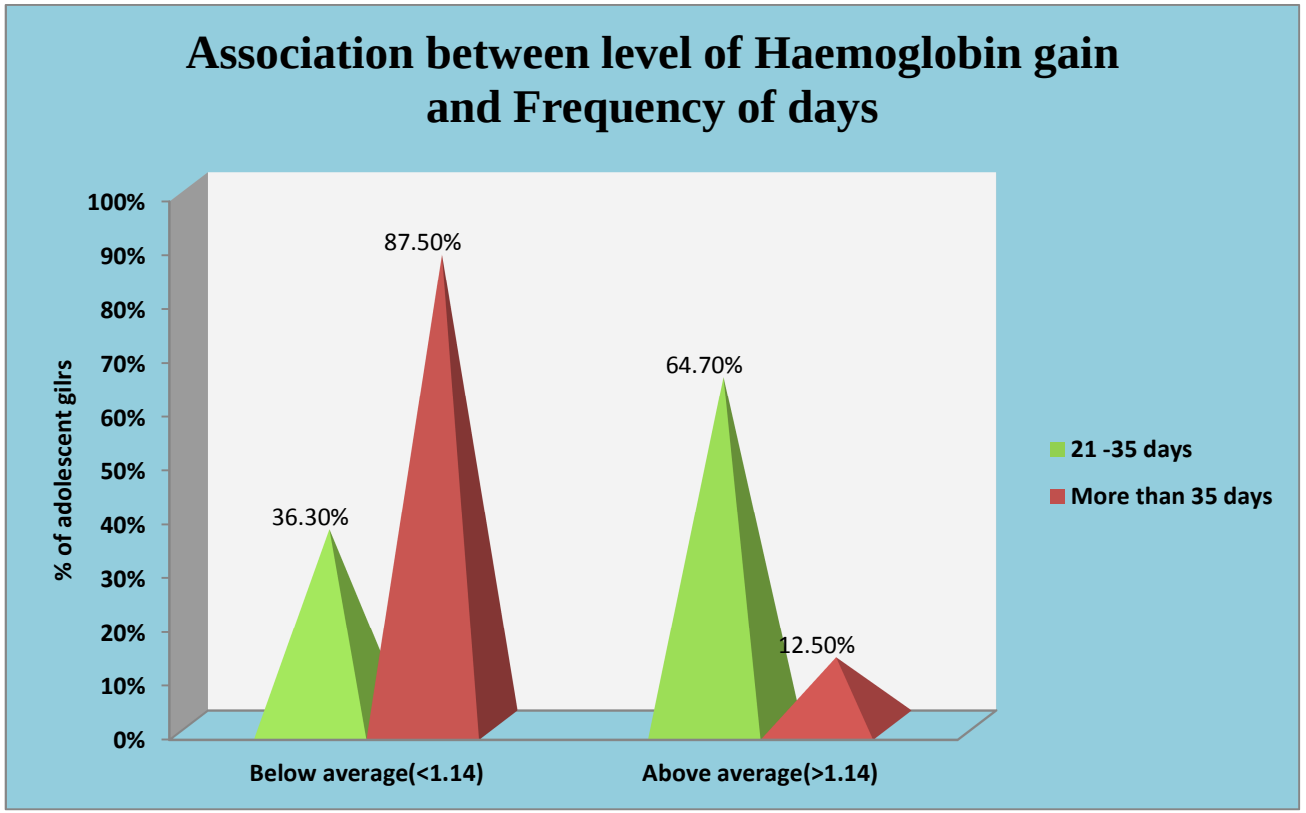


Figure-20: association between levels of haemoglobin gain and their frequency of menstruation in days.

Table 13: Association between level of Hemoglobin gain and demographic variables (Group II)

Demographic variables		Level of haemoglobin gain					
		Below average(<0.48)		Above average(>0.48)			
		n	%	n	%	Total	Chi square test
Age	10 -12 yrs	6	42.9%	8	57.1%	14	$\chi 2=0.53 P=0.46$
	13 -14 yrs	9	56.3%	7	43.8%	16	
Education	7th std	7	53.8%	6	46.2%	13	$\chi 2=0.13 P=0.71$
	8th std	8	47.1%	9	52.9%	17	
Family income	< Rs.2000	6	66.7%	3	33.3%	9	$\chi 2=1.47 P=0.41$
	Rs.2001 - 4000	5	45.5%	6	54.5%	11	
	Rs.4001 - 6000	4	40.0%	6	60.0%	10	
Religion	Hindu	9	50.0%	9	50.0%	18	$\chi 2=0.34 P=0.84$
	Muslim	2	40.0%	3	60.0%	5	
	Christian	4	57.1%	3	42.9%	7	
Type of family	Nuclear family	6	50.0%	6	50.0%	12	$\chi 2=0.00 P=1.00$
	Joint family	9	50.0%	9	50.0%	18	
Dietary pattern	Vegetarian	2	100.0%	0	0.0%	2	$\chi 2=2.14 P=0.15$
	Non vegetarian	13	46.4%	15	53.6%	28	
Birth order	One	3	75.0%	1	25.0%	4	$\chi 2=1.47 P=0.69$
	Two	8	50.0%	8	50.0%	16	
	Three	3	42.9%	4	57.1%	7	
	> Three	1	33.3%	2	66.7%	3	
Toilet facility	Yes	8	53.3%	7	46.7%	14	$\chi 2=0.13 P=0.71$
	No	7	46.7%	8	53.3%	16	
Wearing Cheppal-Toilet	Yes	8	53.3%	7	46.7%	15	$\chi 2=0.13 P=0.71$
	No	7	46.7%	8	53.3%	15	

* significant at P≤0.05 ** highly significant at P≤0.01 *** very high significant at P≤0.001

The above table shows the association between level of hemoglobin gain and their demographic variables. None of the demographic variables associated with hemoglobin gain. Statistical significance was calculated using chi square test.

Table 14: Association between level of Hemoglobin gain and Menstrual history (Group II)

Menstrual history		Level of haemoglobin gain					Chi square test
		Below average(<0.48)		Above average(>0.48)			
		N	%	n	%	Total	
Age at Menarche	8 -10 yrs	3	27.3%	8	72.7%	11	$\chi2$=3.75
	11 -12 yrs	11	64.7%	6	35.3%	17	P=0.14
	13 -14 yrs	1	50.0%	1	50.0%	2	
Menstrual cycles	Regular	7	36.8%	12	63.2%	19	$\chi2$=3.59
	Irregular	8	72.7%	3	27.3%	11	P=0.06
Associated with clots	Yes	5	35.7%	9	64.3%	14	$\chi2$=2.14
	No	10	62.5%	6	37.5%	16	P=0.14
Frequency	21 -35 days	8	72.7%	11	27.3%	19	$\chi2$=1.29
	More than 35 days	7	63.6%	4	36.4%	11	P=0.25
No of Days	< 3days	3	37.5%	5	62.5%	8	$\chi2$=1.30
	3 -7 days	11	57.9%	8	42.1%	19	P=0.52
	> 7 days	1	33.3%	2	66.7%	3	

* significant at P≤0.05 ** highly significant at P≤0.01 *** very high significant at P≤0.001

The above table shows the association between levels of hemoglobin gains and their menstrual history. None of the menstrual history associated with Hemoglobin gain. Statistical significance was calculated using chi square test.

CHAPTER-V
RESULTS AND DISCUSSION

Anaemia is one of the most widespread public health problems, especially in developing countries like India &has important health &welfare, social & economic consequences. These include impaired cognitive development, reduced physical work & in severe cases, an increased risk of mortality particularly during the perinatal period. There is also evidence that anaemia may result in reduced growth & increased morbidity. Given the magnitude of the problem, greater efforts are needed to develop & implement programs, both to prevent & to control anaemia. Research has shown that orange juice will enhance iron absorption thereby haemoglobin level increased the overall health also improved. To minimize the anaemia complications and to improve the quality of life of anaemia clients this experimental study was done. The purpose of the study was to evaluate the effectiveness of orange juice in improving of blood haemoglobin level among adolescent girls with anaemia.

OBJECTIVES OF THE STUDY

1. To assess the pre-test haemoglobin level among adolescent girls in the experimental and control group.
2. To assess the post-test haemoglobin level among adolescent girls in the experimental and control group.
3. To assess the effectiveness of elemental iron with orange juice in the experimental group and elemental iron alone in a control group of the adolescent girls.

4. To compare the pretest and posttest haemoglobin level among adolescent girls in the experimental and control group.
5. To associate findings with the selected demographic variables among adolescent girls in the experimental group.

MAJOR FINDINGS OF THE STUDY

Frequency and percentage distribution of demographic variables of anemia among adolescent girls in experimental and control group are as follows:

- Most of the adolescent girls in experimental group 56.7%(17) were in the age group of 13-14 years, and 43.3% (13) of the adolescent girls were in the age group of 10-12 years in the experimental group and 53.3%(16) were in the age group of 13-14 years and 46.7% (14) were in the age group of 10-12 years in the control group.
- On considering the educational status of the adolescent girls 60.0% (18) are studying 8^{th}std, and 40.0% (12) are studying 7^{th}std in the experimental group and in the control group 56.7% (17) are studying 8^{th}std, and 43.3%(13) are studying 7^{th} std.
- In case of family income 46.7%(14) were between Rs.1590-4726,33.3%(10) were <Rs.1589,20.0%(6) were between Rs.4727-7877 in experimental group, and 36.7%(11) were between Rs.1590-4726, 33.3%(10) were between Rs.4727-7877,30.0%(9) were <Rs.1589 in the control group.
- On the basis of religion majority of the adolescent girls in the experimental group 66.7%(20) were Hindus,20.0% (6)were Christians, 13.3% (4)were Muslims, and 60.0%(18) were Hindus, 23.3%(7) were Christians, 16.7%(5) in the control group.
- Majority of the adolescent girls 66.7% (20) were joint family, 33.3% (10) were nuclear family in the experimental group, and 60.0% (18) were joint family, 40.0%(12) were nuclear family in the control group.

- The Majority of the adolescent girls follows a non vegetarian 90.0%(27), 10.0%(3) were follows vegetarian in the experimental group, and 93.3%(28) were follows non vegetarian, 6.7%(2) were follows vegetarian in the control group.
- On the basis of birth order majority of the adolescent girls 46.7%(14) were second order, 26.6%(8) were third order,20.0%(6) were first order, 6.7%(2) were above three in the experimental group, and 53.3%(16) were second order, 23.4%(7) were third order,13.3%(4) were first order, 10.0%(3) were above three in the control group.
- Majority of them is not having toilet facility in their house 62.1%(18) were not having,37.9%(11) were having toilet facility in experimental group, and 53.3%(16) were not having toilet facility, 46.7%(14) was having toilet facility in control group.
- In experimental group, 56.7 %(17) were using foot wear while going to the toilet, 43.3%(13) were not using foot wear while going to the toilet. whereas in control group, 50.0%(15) of them were using, 50.0%(15) of them were not using.

Frequency and percentage distribution of menstrual history among adolescent girls in experimental and control group are follows:

- Majority of them are attained menarche in the age group of 11-12 years 63.3%(19) were in the age group of 11-12 years, 30.0%(9) were in the age group of 8-10 years, 6.7%(2) were in the age group of 13-14 years in experimental group, and 56.6%(17) were in the age group of 11-12 years, 36.7%(11) were in the age group of 8-10 years, 6.7%(2) were in the age group of 13-14 years in the control group.
- Regarding menstrual cycle 56.7%(17) were getting regular menstrual cycles, 43.3%(13) were getting irregular menstrual cycles in experimental

group, and 63.3%(19) were getting regular menstrual cycles, 36.7%(11) were getting irregular menstrual cycles in control group.

- ❖ Menstrual flow associated with clots described as 63.3%(19) were not associated with clots, 36.7%(11) were associated with clots in experimental group, and 53.3%(16) were not associated with clots, 46.7%(14) were associated with clots in control group.
- ❖ Frequency of menstrual cycle 73.3%(22) were getting between 21-35 days, 26.7%(8) were getting more than 35 days in experimental group, and 63.3%(19) were getting between 21-35 days, 36.7%(11) were getting more than 35 days in control group.
- ❖ Regarding menstrual flow 66.7%(20) were getting 3-7 days, 20.0%(6) were getting <3 days, 13.3%(4) were getting >7 days in experimental group, and 63.3%(19) were getting 3-7 days, 26.7%(8) were getting <3 days, 10.0%(3) were >7 days.

The first objective of the study is to assess the pre-test level of haemoglobin among adolescent girls in experimental and control group

The pretest level of haemoglobin among the adolescent girls both groups I and group II of the adolescent girls. In Group I, 43.3 %(13) were mild anemia, 56.7% (17) were having moderate anemia. In Group II, 50.0% (15) were mild anemia, 50.0 %(15) were having moderate anemia.

The above objective was supported by the following study **Rajaratnam Jolly et al. (2000)** Conducted study on prevalence of anemia they concluded that the prevalence of anemia was 44.8% with severe anemia being 2.1%, moderate 6.3% and mild anemia 36.5%.

The second objective of the study is to assess the post-test level of haemoglobin among adolescent girls in experimental and control group

The posttest levels of haemoglobin among the adolescent girls both group I and group II of the adolescent girls. In Group I, 16.7%(5) were having a normal haemoglobin level, 66.6 %(20) were mild anemia, 16.7%% (5) were having moderate anemia. In Group II, 63.3% (19) were mild anemia, 36.7 %(11) were having moderate anemia.

The third objective is to assess the effectiveness of orange juice with elemental iron in group I and elemental iron supplementation alone in group II of the adolescent girls.

To see the effectiveness of orange juice, in experimental group, the mean haemoglobin level of pretest score was 9.84 gm/dl, the mean haemoglobin level of posttest score was 10.98gm/dl. The mean difference with 95% Confidence interval was 1.14, and the Percentage difference from baseline with 95% Confidence interval was 11.5%.In the control group, the mean haemoglobin level of pretest score was 9.96 gm/dl, the mean haemoglobin level of posttest score was 10.44gm/dl. The mean difference with 95% Confidence interval was 0.48, and the Percentage difference from baseline with 95% Confidence interval was 4.8%.These differences show that, the effectiveness was more, elemental iron given with orange juice than in elemental iron supplementation alone.

The above objective was supported by the following study Amyzhu.et.al.,(2012) conducted on the Evaluation and Treatment of Iron Deficiency Anemia as the first-line treatment for IDA, oral iron is safe, cost-effective, and convenient. Ferrous sulfate and ferrous gluconate are the two preferred oral preparations of iron, given the low cost and good bioavailability of elemental iron. To optimize iron absorption, ferrous salts should be taken with orange juice, since iron is better absorbed in an acidic environment. Furthermore, ascorbic acid reduces the oxidation of ferrous to ferric iron.

The fourth objective is to compare the level of haemoglobin before and after administration of intervention.

i) Comparison of group I and group II haemoglobin level:

In pretest, Experimental group, the mean haemoglobin was 9.84gm/dl and control group the mean haemoglobin was 9.96 gm/dl, so the difference is 0.12, this difference is small and it is not statistically significant difference, t=0.50P=0.61. In posttest, Experimental group, the mean haemoglobin was 10.98 gm/dl and control group the mean haemoglobin was 10.44 gm/dl level of haemoglobin, so the difference is 0.46, **t=2.38** and the p value is **P=0.02*** this difference is large and it is statistically significant difference. Statistical significance was calculated using student‘s independent t-test.

ii) Comparison of pretest and posttest haemoglobin in group I and in group II:

Comparison of pretest, posttest haemoglobin level on an average, in Experimental group, the pretest mean haemoglobin was 9.84gm/dl and the posttest mean haemoglobin was 10.98gm/dl, P=0.001***, so it was statistically very highly significant. In the Control group, the pretest mean haemoglobin was 9.96gm/dl and the posttest mean haemoglobin was 10.44gm/dl, P=0.05*, so it was statistically significant. These results shows that, Orange juice with elemental iron supplementation was very highly significant compared with elemental iron supplementation alone. Hence the hypothesis H2: There will be a significant difference between pre and posttest mean haemoglobin among adolescent girls was accepted.

The above objective was supported by the **American society for clinical nutrition, (1979)** measure iron absorption in children n=25 from meals containing apple juice or orange juice. On two successive days, children consumed identical meals which included apple juice one day and orange juice on the other, in random order. Iron absorption was measured from red blood cell incorporation of the iron

stable isotopes 14 days later. Results shows Median iron absorption from the meal ingested with apple juice was 7.2%. Median iron absorption from the meal ingested with orange juice was 7.8%.They conclude orange is effective than apple.

The fifth objective is to associate findings with the selected demographic variables among adolescent girls in the experimental group.

The above table reveals that those in More income (**χ2=6.55P=0.04***), nuclear families (**χ2=5.40P=0.02***) of adolescent girls gained more Hemoglobin. Statistical significance was calculated using chi square test. This study analysis revealed that there was a significant effect of elemental iron given with orange juice on improving blood haemoglobin level among adolescent girls. Hence the hypothesis H3: There will be significant association between the mean difference in haemoglobin level and a selected demographic variable among adolescent girls in experimental group was accepted.

The above objective supported by the following study conducted by the National Health and Family Welfare Survey (2005-2006) 4465 adolescent girls from 5 districts the prevalence of anemia two-thirds were found in this 19% were moderate to severe. The anemia significance high in rural adolescent girls those belonging to the scheduled and tribes. There is a strong association in socio economic status, illiteracy in anemia.

The assumption of the study was orange juice may have some effect on hemoglobin level is hereby accepted because the present study results also have proved that, in experimental group 43.3%(13) were mild anemia,56.7%(17) were moderate anemia of adolescent girls with below normal hemoglobin levels have improvement in hemoglobin level after the intervention of orange juice with elemental iron for 14 days, after intervention 16.7%(5) were having normal haemoglobin level, 66.6%(20)were having moderate anaemia, 16.7%(5) were having mild anaemia.

In control group 50.0%(15) were mild anemia, 50.0%(15) were moderate anemia of adolescent girls with below normal hemoglobin levels have improvement in hemoglobin level after given T.Ferrous sulfate 325 mg for 14 days, In posttest 63.3%(19) were having mild anaemia, 36.7%(11)were having moderate anaemia. Even though the hemoglobin gain occurred in control group also, compared with experimental group it is minimal.

The overall findings of the study showed that the orange juice was effective iron will absorbed easily in acidic environment and also orange juice is tasty to drink thereby improving the level of hemoglobin on anemia among adolescent girls in experimental group. Thus as a community health nurse the researcher has educated the adolescent girls about the benefits of orange juice at the end of the study.

CHAPTER-VI

6.1 Summary of the study

Iron deficiency anemia will be prevented by adequate dietary intake. Iron is one of the micronutrient. It is used for formation of haemoglobin, oxygen transportation, brain development, regulation of body temperature and muscle activity. When the iron is decreased in human body, it is called as iron deficiency. Iron deficiency is the most common etiological factor in anemia. The decreased hemoglobin level is called as iron deficiency anemia.

According to the World Health Organization, iron deficiency is the number one nutritional disorder in the world. They can be largely avoided by taking simple precautions and proper control of the disease which would certainly make it possible to lead a normal, active and healthy life.

Objectives of the study are:

1. To assess the pre-test haemoglobin level among adolescent girls in the experimental and control group.
2. To assess the post-test haemoglobin level among adolescent girls in the experimental and control group.
3. To assess the effectiveness of elemental iron with orange juice in the experimental group and elemental iron alone in a control group of the adolescent girls.
4. To compare the pretest and posttest haemoglobin level among adolescent girls in the experimental and control group.
5. To associate findings with the selected demographic variables among adolescent girls in the experimental group.

The assumption of the study was orange juice may have some effect on improvement in the level of hemoglobin among adolescent girls.

Extensive review of literature, investigator's professional experience and expert guidance from the field of community health nursing lead the investigator to design the methodology to develop the tool for data collection.

Literature review was done on the present study and presented in the following headings:

1) Literature related to prevalence and incidence of anemia.

2) Literature related to factors influencing iron absorption.

3) Literature related to treatment of anemia.

4) Literature related to the effectiveness of orange juice with elemental iron supplementation

The investigator had developed a conceptual frame work based on modified Model of Wiedenbach's helping Art of Clinical Nursing Theory (1964). It has 3 components which includes pre assessment as identification, providing orange juice with elemental iron on experimental group, elemental iron alone in control group as ministration, the effectiveness of orange juice as the validation of the system. The modified framework portrays that modifying factor such as orange juice enhances absorption of iron thereby increases the hemoglobin level among adolescent girls as part of dietary nursing intervention.

The present study was an experimental study. The research design was pre-test post-test design. By using simple random sampling technique 60 adolescent girls between the age group of 10-14 years were selected (30 in experimental group and 30 in control group) as study samples. The study was conducted in the selected schools of choolai, Chennai, which is situated 4 kms from College of Nursing, Madras Medical College, Chennai. The tool developed and used for data collection was structured interview and observation schedule. The content validity of the tool was obtained from a medical expert and nursing experts. The tool was reliable and feasible. The reliability of the tool was established by inter rater reliability method.

Data collected from the accessible population based on inclusion and exclusion criteria. Samples were selected by simple random sampling method. Pretest level of hemoglobin checked in experimental and control group before intervention. 50 ml of orange juice given with elemental iron to experimental group for 14 days daily in the afternoon after lunch by the researcher in person. Post interventional levels of haemoglobin were assessed by hemoglobin meter and the results were analyzed using inferential and statistical analysis.

6.2 Major findings of the study

Frequency and percentage distribution of demographic variables on anemia among adolescent girls in experimental and control group are follows:

- Most of the adolescent girls in experimental group 56.7%(17) were in the age group of 13-14 years, and 43.3% (13) of the adolescent girls were in the age group of 10-12 years in the experimental group and 53.3%(16) were in the age group of 13-14 years and 46.7% (14) were in the age group of 10-12 years in the control group.
- On considering the educational status of the adolescent girls 60.0% (18) are studying 8^{th} std, and 40.0% (12) are studying 7^{th} std in the experimental group and in the control group 56.7% (17) are studying 8^{th} std, and 43.3%(13) are studying 7^{th} std.
- In case of family income 46.7%(14) were between Rs.1590-4726,33.3%(10) were <Rs.1589,20.0%(6) were between Rs.4727-7877 in experimental group, and 36.7%(11) were between Rs.1590-4726, 33.3%(10) were between Rs.4727-7877,30.0%(9) were <Rs.1589 in the control group.
- On the basis of religion majority of the adolescent girls in the experimental group 66.7%(20) were Hindus,20.0% (6)were Christians, 13.3% (4)were Muslims, and 60.0%(18) were Hindus, 23.3%(7) were Christians, 16.7%(5) in the control group.

- ❖ Majority of the adolescent girls 66.7% (20) were joint family, 33.3% (10) were nuclear family in the experimental group, and 60.0% (18) were joint family, 40.0%(12) were nuclear family in the control group.
- ❖ Majority of the adolescent girls follows non vegetarian 90.0%(27), 10.0%(3) were follows vegetarian in the experimental group, and 93.3%(28) were follows non vegetarian, 6.7%(2) were follows vegetarian in the control group.
- ❖ On the basis of birth order majority of the adolescent girls 46.7%(14) were second order, 26.6%(8) were third order,20.0%(6) were first order, 6.7%(2) were above three in the experimental group, and 53.3%(16) were second order, 23.4%(7) were third order,13.3%(4) were first order, 10.0%(3) were above three in the control group.
- ❖ Majority of them is not having toilet facility in their house 62.1%(18) were not having,37.9%(11) were having toilet facility in experimental group, and 53.3%(16) were not having toilet facility, 46.7%(14) were having toilet facility in control group.
- ❖ In experimental group 56.7 %(17) were using foot wear while going to the toilet, 43.3%(13) were not using foot wear while going to the toilet, whereas in control group 50.0%(15) of them were using, 50.0%(15) of them were not using.

Frequency and percentage distribution of menstrual history among adolescent girls in experimental and control group are follows:

- ❖ Majority of them are attained menarche in the age group of 11-12 years 63.3%(19) were in the age group of 11-12 years, 30.0%(9) were in the age group of 8-10 years, 6.7%(2) were in the age group of 13-14 years in experimental group, and 56.6%(17) were in the age group of 11-12 years,

36.7%(11) were in the age group of 8-10 years, 6.7%(2) were in the age group of 13-14 years in the control group.

- ❖ Regarding menstrual cycle 56.7%(17) were getting regular menstrual cycles, 43.3%(13) were getting irregular menstrual cycles in experimental group, and 63.3%(19) were getting regular menstrual cycles, 36.7%(11) were getting irregular menstrual cycles in control group.
- ❖ Menstrual flow associated with clots described as 63.3%(19) were not associated with clots, 36.7%(11) were associated with clots in experimental group, and 53.3%(16) were not associated with clots, 46.7%(14) were associated with clots in control group.
- ❖ Frequency of menstrual cycle 73.3%(22) were getting between 21-35 days, 26.7%(8) were getting more than 35 days in experimental group, and 63.3%(19) were getting between 21-35 days, 36.7%(11) were getting more than 35 days in control group.
- ❖ Regarding menstrual flow 66.7%(20) were getting 3-7 days, 20.0%(6) were getting <3 days, 13.3%(4) were getting >7 days in experimental group, and 63.3%(19) were getting 3-7 days, 26.7%(8) were getting <3 days, 10.0%(3) were >7 days.
- ❖ The pretest level of haemoglobin among the adolescent girls both groups I and group II of the adolescent girls. In Group I, 43.3 %(13) were mild anemia, 56.7% (17) were having moderate anemia. In Group II, 50.0% (15) were mild anemia, 50.0 %(15) were having moderate anemia.
- ❖ The posttest levels of haemoglobin among the adolescent girls both group I and group II. In Group I, 16.7% (5) were having normal level of Hemoglobin, 66. 6% (20) were having mild anemia, 16.7% (5) were having moderate anemia. In Group II, 63.3% (19)were having mild anemia, 36.7% (11) were having moderate anemia.

- Comparison of haemoglobin in group I and group II, In pretest, Experimental group, the mean haemoglobin was 9.84gm/dl and control group the mean haemoglobin was 9.96 gm/dl, so the difference is 0.12 , this difference is small and it is not statistically significant difference, t=0.50P=0.61. In posttest, Experimental group, the mean haemoglobin was 10.98 gm/dl and control group the mean haemoglobin was 10.44 gm/dl level of haemoglobin, so the difference is 0.46, this difference is large and it is statistically significant difference. Statistical significance was calculated using student‘s independent t-test **t=2.38P=0.02***
- Comparison of pretest and posttest haemoglobin,In Experimental group, the pretest level of mean haemoglobin was 9.84gm/dl and the posttest level of haemoglobin was 10.98gm/dl, the statistical significance was calculated by Student’s paired t-test, the p value was P=0.001***, so it was statistically very highly significant. In Control group, the pretest level of mean haemoglobin was 9.96gm/dl and the posttest level of mean haemoglobin was 10.44gm/dl, the statistical significance was calculated by Student’s paired t-test, the p value was P=0.05*, so it was statistically significant. These results indicate that, Orange juice with elemental iron supplementation was very highly significant compare with elemental iron supplementation alone.
- In experimental group, the mean haemoglobin level of pretest score was 9.84 gm/dl, the mean haemoglobin level of posttest score was 10.98 gm/dl. The mean difference with 95% Confidence interval was 1.14, and the Percentage difference from baseline with 95% Confidence interval was 11.5%. In control group, the mean haemoglobin level of pretest score was 9.96 gm/dl, the mean haemoglobin level of posttest score was 10.44 gm/dl. The mean difference with 95% Confidence interval was 0.48, and the

Percentage difference from baseline with 95% Confidence interval was 4.8%. These difference shows that, the effectiveness was more in orange juice with elemental iron than elemental iron supplementation alone.

- ❖ The overall findings of the study showed that the orange juice was effective to improve the level of hemoglobin on anemia among adolescent girls in experimental group. Thus as a community health nurse the researcher has educated the adolescent girls about the benefits of orange juice at the end of the study.
- ❖ In this study it was found that among adolescent girls in the experimental group with more income, nuclear family, regular menstrual cycles, frequency of menstruation is between 21-35 days are gained hemoglobin level than others, and there is no significant association with the control group.

6.3 IMPLICATIONS OF THE STUDY

The implications of this study can be seen in areas of nursing practice, nursing education, nursing administration and nursing research.

NURSING PRACTICE

- ❖ The community health nurses have a vital role in providing information for all the adolescent population.
- ❖ The community health nurse as a service provider should periodically organize and conducts mass education program regarding iron deficiency anemia awareness.
- ❖ Orange fruit is locally available and palatable to eat and have high vitamin C content and enhances in iron absorption thereby increasing hemoglobin level, the community health nurse must implement information education and communication (IEC) to create awareness to the community on the benefits of orange and other vitamin C fruits.

NURSING EDUCATION

- ❖ As a nurse educator, we must strengthen the concept of non-pharmacological methods for management of anemia.
- ❖ Nursing education should emphasize more on preparing the nurses to impart current changes in health information and to update the knowledge in all fields.
- ❖ Nursing curriculum to be equipped with knowledge regarding various health information.

NURSING ADMINISTRATION

- ❖ The community health nurse as an administrator should design formal teaching programme on adolescent anemia and its prevention using pharmacological and various non-pharmacological methods in improving blood hemoglobin level.
- ❖ The nurses posted in the Primary Health Centers for control and prevention of non-communicable disease should take active part in identifying the risk peoples and preventing the occurrence of disease in its earlier stage.
- ❖ She should organize for adolescent anaemia camps collaboration with nursing students attending the Primary Health Centre and along with other NGO'S and it should be properly communicated to the public through mass media.

NURSING RESEARCH

- ❖ Nurses should conduct periodic review of research findings and disseminate the findings through conferences, seminars and publication in professional, national and international journals and in the web site also.

6.4 RECOMMENDATIONS

- The same study could be conducted in a large sample to generalize the results.
- The study could be replicated in different settings with similar facilities.
- A similar study could be conducted by using Solomon four group design.
- A comparative study can be conducted in adolescent girls and adolescent boys.
- The study could be conducted with measuring other biological parameter. e.g. Serum Ferritin level.
- The study could be conducted with other available local resources e.g. Guava, Lemon, Gooseberry.
- The adolescent children should be educated by means of mass health awareness programs on adolescent anaemia

6.5 CONCLUSION

Adequate level of hemoglobin is very essential for every healthy person. Administration of orange juice and elemental iron supplementation is simple and easy to implement and most acceptable method for anemic clients. The finding of the study supports this intervention for girls with anemia which is best intervention to promote hemoglobin level. The clinical and community health nurse should understand the importance of hemoglobin level among adolescent girls and to attend to the girls with anemia with these types of natural treatment modalities.

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PROCEDURE

PREPARATION OF ORNGE JUICE

Definition

This is a juice prepared from oranges.

Purpose

Orange is containing high Vit C which will enhance easy absorption of iron.

Preparation of the client

Explain the procedure to the adolescent girls, and explain about the action of Orange Juice.

Sources of Orange Juice

From Fresh Oranges

Preparation of Orange Juice

Extract 50 ml of juice from fresh Oranges, given Post lunch daily for 14 days.

Action of Orange Juice

Orange has remedy to various health problems like easy absorption of iron, healthy skin, improve the immune system etc.. Orange juice is taken with iron to promote health, as this helps to absorb iron easily because of their acidic in nature.

Documentation

Record the procedure with date and time.

RESEARCH TOOL

PART - A

DEMOGRAPHIC DATA

INSTRUCTIONS:

- Please be frank and free in answering the question.
- Read each item carefully and answer all the questions.
- Answers will be used only for research purpose and will be confidential.
- Please put a tick mark at the appropriate option.
- Please return back the questionnaire after answering all the questions.

S.No …….

Name ……..

1. Age in years

a. 10-12 ☐ b. 13-14 ☐

2. Educational status in standard

a. 7^{th} ☐ b. 8^{th} ☐

3. Family income per month in rupees

a. <Rs.1589 ☐ b. 1590-4726 ☐

c. 4727-7877 ☐ d. 7878-11386 ☐

4. Religion

a. Hindu ☐ b. Muslim ☐

c. Christian ☐ d. Others ☐

5. Type of family

a. Nuclear family ☐ b. Joint family ☐

6. Dietary pattern

a. Vegetarian ☐ b. Non vegetarian ☐

c. Mixed ☐

7. Birth order

a. One ☐ b. Two ☐

c. Three ☐ d. Three and above ☐

8. Whether toilet facility is available in your house

a. Yes ☐ b. No ☐

9. While going to toilet you wear footwear

a. Yes ☐ b. No ☐

PART-B

MENSTRUAL HISTORY

10. Age at menarche in yrs

a. 8- 10 ☐ b.11-12 ☐

c.13-14 ☐

11. Menstrual cycle

a. Regular ☐ b. Irregular ☐

12. Whether associated with clots?

a. Yes ☐ b. No ☐

13. Frequency of menstrual cycle

a. 21-35 days ☐ b. Before 21 days

c. More than 35 days ☐

14. Days of menstrual flow

a. Below 3 days ☐ b. 3-7days ☐

c. Above 7 days ☐

PART – C

LEVEL OF ANEMIA

Ranges of hemoglobin in adolescent girls	Anemic range
12g/dl & above	Normal
< 12g/dl	anemia
10 – 11.9g/dl	Mild anemia
07 – 9.9g/dl	Moderate anemia
< 07g/dl	Severe anemia

By- WHO, UNICEF, 1998.

வினாத்தாள்

பிரிவு - அ

சோதனையாளரின் எண்ணிக்கை .....

பெயர் .....

1. வயது(வருடங்களில்)

அ. 10 – 12 ☐ ஆ. 13 -14 ☐

2. கல்வித்தகுதி

அ. 7ஆம் வகுப்பு ☐ ஆ. 8ஆம் வகுப்பு ☐

3. குடும்ப மாத வருமானம்

அ. <2000 ரூ ☐ ஆ. 2001-4000 ரூ ☐

இ. 4001-8000 ரூ ☐ ஈ. 8001-10000 ரூ ☐

உ. >10000 ரூ ☐

4. மதம்

அ.இந்து ☐ ஆ.முஸ்லீம் ☐

இ.கிருஸ்துவர் ☐ ஈ.மற்றவை ☐

5. குடும்பவகை

அ. தனிக்குடும்பம் ☐ ஆ. கூட்டுக்குடும்பம் ☐

6. உணவு முறை

அசைவ உணவு உண்பவர். ☐ ஆஅசைவ உணவுஉண்பவர். ☐

இஇரண்டும் கலந்து உண்பவர். ☐

7. குடும்பத்தில் உள்ள குழந்தைகளின் எண்ணிக்கை

அஒன்று . ☐ ஆஇரண்டு . ☐

இ ☐ . ஈமூன்றுக்கு மேல். ☐

8. உங்கள் வீட்டில் கழிவறை வசதி உள்ளதா?

அஇல்லை .ஆமாம் ☐ ஆ . ☐

9. நீங்கள் கழிவறைக்கு செல்லும் போது காலனி அணிந்து செல்வீர்களா?

அஇல்லை .ஆமாம் ☐ ஆ . ☐

பிரிவு –ஆ

மாதவிடாய் சுழற்ச்சி பற்றிய விவரம்

10. பருவம் அடைந்த வயது வருடங்களில்

அ .8 – 10 ☐ ஆ .11 -12 ☐

இ.13-14 ☐

11. மாதவிடாய் சுழற்சி

அஅசதாரனமாக .சதாரனமாக ☐ ஆ . ☐

12.மாதவிடாய் சுழற்சியின்போது இரத்தப்போக்குடன் கட்டி கலந்து வருமா?

அ இல்லை .ஆமாம் ☐ ஆ . ☐

13. எத்தனை நாட்களுக்கு ஒரு முறை மாதவிடாய் சுழற்சி நடைபெறும்?

அ.21-35 நாட்களுக்கு ஒரு முறை ☐ ஆ.21 நாட்களுக்கு முன் ☐

இ.35 நாட்களுக்கு பின் ☐

14. உதிரப்போக்கு செல்லும் நாட்கள்

அ.3 நாட்களுக்கு குறைவாக ☐ ஆ.3-7 நாட்கள் ☐

ஈ.7 நாட்களுக்கு மேல் ☐

INSTITUTIONAL ETHICS COMMITTEE
MADRAS MEDICAL COLLEGE, CHENNAI -3

EC RegNo.ECR/270/Inst./TN/2013
Telephone No : 044 25305301
Fax : 044 25363970

CERTIFICATE OF APPROVAL

To
E.Viji,
M.Sc.,(N) II year,
College of Nursing,
Madras Medical College, Chennai-3.

Dear E.Viji,

The Institutional Ethics committee of Madras Medical College, reviewed and discussed your application for approval of the proposal entitled " Assess the effectiveness of orange juice with elemental iron versus elemental iron supplementation to increase the level of hemoglobin on anaemia among adolescent girls in Corporation school, Choolai, Chennai " No.30072013.

The following members of Ethics Committee were present in the meeting held on 06.07.2013 conducted at Madras Medical College, Chennai -3.

1. Dr.G.SivaKumar, MS FICS FAIS --- Chairperson
2. Prof. R. Nandhini MD -- Member Secretary
   Director, Instt. of Pharmacology ,MMC, Ch-3
3. Prof. Shyamraj MD -- Member
   Director i/c , Instt. of Biochemistry , MMC, Ch-3
4. Prof. P. Karkuzhali. MD -- Member
   Prof., Instt. of Pathology, MMC, Ch-3
5. Prof. Kalai Selvi -- Member
   Prof of Pharmacology, MMC, Ch-3
6. Prof. Siva Subramanian, -- Member
   Director, Instt. of Internal Medicine, MMC, Ch-3
7. Thiru. S. Govindsamy. BABL -- Lawyer
8. Tmt. Arnold Saulina MA MSW -- Social Scientist

We approve the proposal to be conducted in its presented form.

Sd/ Chairman & Other Members

The Institutional Ethics Committee expects to be informed about the progress of the study, and SAE occurring in the course of the study, any changes in the protocol and patients information / informed consent and asks to be provided a copy of the final report.

R Nandhini

Member Secretary, Ethics Committee

CERTIFICATE OF CONTENT VALIDITY

This is to certify that the tool developed by Mrs.E.Viji, M.Sc. Nursing, II year College of Nursing,Madras Medical College, Chennai-03 undertaking a research study on **"Assess the effectiveness of orange juice with elemental iron versus elemental iron supplementation to increase the level of haemoglobin on anaemia among adolescent Girls in Corporation School at Choolai, Chennai."**has been validated by me and is found to be valid and up to date.

Signature: V.V. [signature] 21/11/17

Name: Dr. V.V. ANANTHA RAMAN

Designation:

Date:

Place:

Seal:

CHIEF CIVIL SURGEON
ASSOCIATE PROFESSOR
INSTITUTE OF COMMUNITY MEDICINE
MADRAS MEDICAL COLLEGE
CHENNAI-600 003

CERTIFICATE OF CONTENT VALIDITY

This is to certify that the tool developed by Mrs.E.Viji, M.Sc. Nursing, II year College of Nursing,Madras Medical College, Chennai-03 undertaking a research study on **"Assess the effectiveness of orange juice with elemental iron versus elemental iron supplementation to increase the level of haemoglobin on anaemia among adolescent Girls in Corporation School at Choolai, Chennai."** has been validated by me and is found to be valid and up to date.

Signature: V. Ebigoldamary

Name: V- EBI GOLDAMARY

Designation: READER.

Date: 17-08-13

Place: CHENNAI.

Seal: MADHA COLLEGE OF NURSING 17 AUG 2013 CHENNAI - 600 069

Ref Lr no 239/Cont/mmc/Ch. dated 10.7.13

From

Mrs.E. VIJI,
Msc.,(Nursing) II year,
College of Nursing,
Madras Medical College,
Chennai-3.

To

Assistant Elementary Educational Officer,
Periamedu Range,
Davidson Raod,
Chennai.

Through Proper Channel,

Respected Madam,

Sub: Requesting Permission to conduct a research study- reg

I Mrs. E. Viji, studyingMsc(N), II Year College of Nursing, Madras Medical College, kindly request you to grant me permission for the study proposed to conduct on the topic **"Assess the effectiveness of orange juice with elemental iron verses Elemenatal iron supplementation to increase the level of haemoglobin on anaemia adolescent girls in Hindu Union Middle School and VishwaBharathi Middle School, choolai in Chennai"**to fulfil the requirement of data collection. I assure you that it will not interfere with routine activities of the school's regular activities.

Forwarded
15/07/13

Thanking You,

Yours Obediently,

E. Viji.

Date: 10.07.13
Place: Chennai-3.

15/7/13
Asst. Ele. Educational Officer
Periamet Range, Chennai-1

Dr.P.KUGANANTHAM.
M.B.B.S., D.P.H., M.P.H.,
WHO Fellow (Johns Hopkins, USA)
D.T.M&H (LSTM& H-UK), F.I.S.C.D.
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E-mail.drkugan@yahoo.com
/ho@chennaicorporation.gov.in

HDC.No.C1/5150/2013 Date: 08.08.2013

Sir/Madam,

Sub: Corporation of Chennai – Public Health Department – Field study – Requisition for permission for the terms of research study at choolai Community area of Chennai assessing their health status – reg.

Ref: 1.Letter from the principal, Madras Medical College, Chennai Dated: 16.07.2013.

2. Orders of the Deputy Commissioner (Health), Dated: 29.07.2013

****

As per the orders of the Deputy Commissioner (Health) in the reference second cited, 11 M.sc (Nursing) student of the Madras Medical College, Chennai is permitted to research study at choolai community area of Chennai and assessing their health status with the usual conditions as detailed below.

1. Corporations name in all publications and Corporation Health officials as Co-Author.
2. Reports should be well informed to official of Health Department.
3. No negative reporting about corporation to be made.

CITY HEALTH OFFICER

To
E.Viji,
Msc.,(Nursing) II Year,
College of Nursing,
Madras Medical College,
Chennai – 600 003.

சுய ஒப்புதல் படிவம்

1. வளர் இளம் பள்ளிக்கூட பெண்களுக்கு இரும்புச் சத்து மாத்திரைகள் மட்டுமல்லாமல் இரும்புச்சத்து மாத்திரைகளுடன் ஆரஞ்சுப்பழச்சாறு கொடுப்பதன் மூலம் இரத்த சிவப்பணுக்களின் எண்ணிக்கை அதிகரிக்கும் என்பதை பற்றிய ஓர் திறனாய்வு

பெயர் : வயது: தேதி: வெளி நோயாளி எண்:

..... என்பராகிய நான் இந்த ஆய்வின் விவரங்களும் அதன் நோக்கங்களும் முறையாக கொண்டேன். எனது சந்தேகங்கள் அனைத்திற்கும் தகுந்த விளக்கம் அளிக்கப்பட்டது. இந்த ஆய்வில் முழு சுதந்திரத்துடன் மற்றும் சுயநினைவுடன் பங்கு கொள்ள சம்மதிக்கிறேன்.

எனக்கு விளக்கப்பட்ட விஷயங்களை நான் புரிந்து கொண்டு நான் எனது சம்மதத்தைத் தெரிவிக்கிறேன். இச்சுய ஒப்புதல் படிவத்தை பற்றி எனக்கு விளக்கப்பட்டது.

இந்த ஆய்வினை பற்றிய அனைத்து தகவல்களும் எனக்கு தெரிவிக்கப்பட்டது. இந்த ஆய்வில் எனது உரிமை மற்றும் பங்கினை பற்றி அறிந்து கொண்டேன்.

இந்த ஆய்வில் பிறரின் நிர்பந்தமின்றி என் சொந்த விருப்பத்தின் பேரில் தான் பங்கு பெறுகிறேன் மற்றும் நான் இந்த ஆராய்ச்சியிலிருந்து எந்நேரமும் பின் வாங்கலாம் என்பதையும் ஆதனால் எந்த பாதிப்பும் ஏற்படாது என்பதையும் நான் புரிந்து கொண்டேன்.

இந்த ஆய்வில் கலந்து கொள்வதன் மூலம் என்னிடம் பெறப்படும் தகவலை ஆய்வாளர் இன்ஸ்டிட்யூசனல் எத்திக்ஸ் கமிட்டியினரிடமோ, அரசு நிறுவனத்திடமோ தேவைப்பட்டால் பகிர்ந்து கொள்ளலாம் என சம்மதிக்கிறேன்.

இந்த ஆய்வின் முடிவுகளை வெளியிடும்போது எனது பெயரோ, அடையாளமோ வெளியிடப்படாது என அறிந்து கொண்டேன். இந்த ஆய்வின் விவரங்களைக் கொண்ட தகவல் தாளைப் பெற்றுக் கொண்டடேன்.

இந்த ஆய்வில் பங்கேற்கும் பொழுது ஏதேனும் சந்தேகம் ஏற்பட்டால், உடனே ஆய்வாளரை தொடர்பு கொள்ள வேண்டும் என் அறிந்து கொண்டேன்.

நான் இந்த ஆய்வில் இரத்த மாதிரிகள் எடுக்க அனுமதி தருகிறேன்.

இச்சுய ஒப்பதல் படிவத்தில் கையெழுத்திடுவதன் மூலம் இதிலுள்ள அனைத்து விஷயங்களும் எனக்கு தெளிவாக விளக்கப்பட்டது என்று தெரிவிக்கிறேன் என்று புரிந்து கொண்டேன். இச்சுய ஒப்புதல் படிவத்தின் ஒரு நகல் எனக்கு கொடுக்கப்படும் என்று தெரிந்து கொண்டேன்.

பங்கேற்பாளர் கையொப்பம் / பெற்றோர் கையொப்பம் / பாதுகாவலர் கையொப்பம் தேதி :

ஆய்வாளர் கையொப்பம்

தேதி :

ஆய்வு தகவல் தாள்

பங்கேற்பாளர் பெயர் :
ஆராய்ச்சியாளர் பெயர் :
ஆய்வு தலைப்பு : வளர் இளம் பள்ளிக்கூடப்பெண்களுக்கு இரும்பு சத்து மாத்திரைகள் மட்டுமல்லாமல், இரும்பு சத்து மாத்திரைகளுடன், ஆரஞ்சு பழச்சாறு, கொடுப்பதன் மூலம், இரத்த சிவப்பணுக்களின் எண்ணிக்கை அதிகரிக்கும் என்பதை பற்றிய ஒர் திறனாய்வு

இந்த ஆய்வு சென்னையில் உள்ள சூளை பகுதியில் மேற்கொள்ளப்படவுள்ளது.

உங்களை இந்த ஆய்வில் பங்கேற்க அழைக்கிறோம். நீங்கள் இந்த ஆய்வில் பங்கேற்கலாமா அல்லது வேண்டாமா? என்பதை முடிவு செய்ய இந்த ஆவணத்தில் உள்ள தகவல் உதவியாக இருக்கும். உங்களுக்கு ஏதேனும் சந்தேகம் இருந்தால் நீங்கள் எங்களிடம் வெளிப்படையாக கேட்கலாம்.

எங்களுடைய அடிப்படை தகுதிகளில் நீங்கள் திருப்தியாக இருப்பதால் உங்களை இந்த ஆய்வில் பங்கேற்க அழைக்கிறோம்.

ஆய்வின் நோக்கம் மற்றும் செயல்பாடு

வளர் இளம் பள்ளிக்கூடப்பெண்களுக்கு இரும்பு சத்து மாத்திரைகள் மட்டுமல்லாமல், இரும்பு சத்து மாத்திரைகளுடன், ஆரஞ்சு பழச்சாறு, கொடுப்பதன் மூலம், இரத்த சிவப்பணுக்களின் எண்ணிக்கை அதிகரிக்கும் என்பதை பற்றிய ஒர் திறனாய்வு

இந்த ஆய்வில் உங்களது பெயர், வயது, இருப்பிடம், கல்வி, இரத்த சிவப்பணுக்களின் அளவு ஆகிய தகவல்களை பெற்றுக்கொள்வோம்.

சில தகவல்கள் உங்களிடம் பெறப்படும்

உங்களுக்கு, உங்களுடைய தகவல்களை ரகசியாக வைத்துக்கொள்ளும் உரிமை உண்டு. நீங்கள் இந்த ஆய்வில் கையொப்பமிடுவதால் நீங்கள் உங்களுடைய தகவலை, ஆய்வுக்குழு மற்றும் நிறுவனத்திடம், காட்ட வேண்டும். இந்த ஆராய்சியின் தகவல்கள் விஞ்ஞான இதழ்கள் மற்றும் விஞ்ஞான கூடத்தில் வெளியிடப்பட்டாலும் உங்களுடைய அடையாளங்கள் காட்டப்படமாட்டாது.

ஆராய்ச்சியாளர் கையொப்பம் தேதி :

பங்கேற்பாளர் கையொப்பம் / பெற்றோர் கையொப்பம் / பாதுகாவலர் கையொப்பம் தேதி :